PRINCIPLES OF COOKING

EMMA CONLEY

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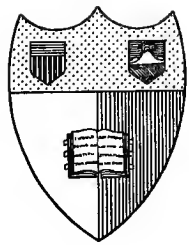

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Frontispiece.

A MODEL KITCHEN WITH COMPLETE EQUIPMENT.

PRINCIPLES OF COOKING

A TEXTBOOK IN DOMESTIC SCIENCE

BY

EMMA CONLEY

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PREFACE

"PRINCIPLES OF COOKING" is intended as a textbook in cooking and elementary food study for secondary and vocational schools. It is not merely a cook book. So many good cook books are on the market that there would be no justification for adding another to the list. The cook book, however, merely presents hundreds of recipes showing innumerable ways in which foods may be prepared, without attempting to present the principles underlying all cooking.

The principles of cooking are few in number and are easily mastered, if properly presented. Foods may be grouped in less than a dozen classes, and when the principles which apply to each class are learned and practiced, each pupil will know how to prepare a variety of dishes from each food or class of foods.

After the principles of cooking are fully understood and applied in practical lessons, there is no educational or practical value in the preparation of isolated recipes or in a sequence of lessons on one class of foods. The object of domestic science work in schools is that a girl may learn how to plan, cook, and serve meals at home, calculate the cost, and purchase foods in the best market at the lowest price. This includes knowing the nutritive value of each food and its place in the diet.

Unless considerable practice is given in schools in planning and preparing meals, a pupil may be able to cook one or two single foods, but she cannot prepare all the

dishes needed for a meal and have them ready to serve at a stated time.

It is with this aim in mind, that all cooking in schools should lead to the preparation of attractive, appetizing, nutritious, well-balanced meals, that "Principles of Cooking" and its companion book, "Nutrition and Diet," are written. They are intended for pupils who have had cooking in the grades or for those who are mature enough to master a few important and essential facts, presented in Chapters II and III, before proceeding to the practical work of cooking. Any high school girl can learn these facts as easily as she can master problems in algebra or geometry, learn a history lesson, or calculate balanced rations for farm animals in a class in agriculture.

High school work in cooking or domestic science must include some acquisition of knowledge concerning foods, as well as practical work, to make it equivalent in value to other high school subjects, and to deserve a credit towards college entrance requirements.

If one year is devoted to the work presented in "Principles of Cooking," and "Nutrition and Diet," the credit given in high school for the work should be equivalent to the credit given for a year's work in any other high school subject.

Practically all of the recipes in this book are the result of class experiments made by varying standard recipes or by trying new combinations of foods. A few recipes were contributed by friends. All recipes have been tried, many times, by classes of students and proved reliable.

Every school library should contain at least one reliable cook book, as the "Boston Cooking School Cook Book" or "Practical Cooking and Serving," and advanced pupils should compare recipes grouped together. They should

note the points of variation from the standard recipe of the group and be able to make new and attractive food combinations for themselves. All cooking is based on a few standard recipes, changed or altered to produce variety.

If an intelligent study is made of the principles of cooking and their application, preparing foods will no longer be a work of uncertainty, but an interesting, scientific, and comparatively easy process, and the preparing of nutritious, wholesome, and balanced meals will be a pleasure.

EMMA CONLEY.

FOND DU LAC, WISCONSIN.

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PRINCIPLES OF COOKING

CHAPTER I

GENERAL DIRECTIONS FOR WORK IN A SCHOOL KITCHEN

In a school kitchen each girl has her own place at the kitchen table and is responsible for the washing of her own dishes, care and proper placing of all her utensils, the condition of her table, dish towels, etc.

The general household duties are assigned to the various pupils in turn, so that the kitchen will be left in perfect order at the close of the lesson and the pupils will have practice in this important part of the work. Practice in this work trains each pupil to do all kitchen duties, develops her interest and responsibility in the proper care of the kitchen, makes her familiar with the contents of the cupboards, and the proper places to keep supplies, china, linen, and various utensils. It also trains her in the very important duties of caring for the stove, oven, sink, and floor, and unifies the work so that it is like actual housekeeping.

The following is an easy arrangement of work in the school kitchen: —

Housekeeper 1. Care of supplies used in the daily lesson.

Housekeeper 2. Building of fire, care of stove and tea-kettle, and attending to the oven during baking.

Housekeeper 3. Care of sink.

Housekeeper 4. Sweeping of kitchen at the close of the lesson.

Suggestions for Pupils. — 1. Be sure that hands and nails are clean before coming to class.

2. Wash the hands before the beginning of the lesson and keep them clean.

3. Always keep the hair neatly combed.

4. Do not wear rings while cooking.

5. Always wear an apron, and a holder suspended from the apron by a tape.

6. Never use an apron in place of a holder.

7. Never taste food with a mixing spoon.

8. Do not leave the spoon in the food while it is cooking.

9. Keep the tables clean and in order.

10. Keep the drawers and cupboards closed.

11. Collect all utensils and supplies needed for work, before beginning to prepare the food.

12. Do not use unnecessary utensils.

13. Have all materials measured and ready for use before beginning to put them together.

14. Measure accurately, for on that depends the success of your cooking.

15. Do not waste material.

16. Work quietly, quickly, carefully, and neatly.

17. Practice at home the things learned at school.

18. Try each recipe at home.

19. Calculate the cost of each recipe.

A list of the foods most frequently used in the home, of seasonable vegetables and fruits, and the prices of each, should be posted weekly in a conspicuous place in the kitchen so that pupils will learn to note cost, calculate the cost of various foods, and know when is the best time to purchase and serve certain vegetables and fruits.

Each recipe given in this book will serve six people. For school work one fourth of each recipe is taken, unless otherwise stated.

ABBREVIATIONS AND MEASUREMENTS USED IN COOKING

tsp. — teaspoon	oz. — ounce
tbsp. — tablespoon	lb. — pound
c. — cup	spk. — speck
pt. — pint	bk. pd. — baking powder
qt. — quart	min. — minute

3 tsp. = 1 tbsp.	4 tbsp. flour = 1 oz. (about)
16 tbsp. = 1 c.	2 c. sugar = 1 lb.
2 c. = 1 pt.	2 c. butter = 1 lb.
2 pt. = 1 qt.	$3\frac{1}{4}$–4 c. flour = 1 lb.
2 tbsp. butter = 1 oz.	9 large eggs = 1 lb.
2 tbsp. sugar = 1 oz.	2 c. lard = 1 lb.

All measures are leveled.
In leveling dry materials, level with a knife.
Divide with a knife lengthwise for one half a spoon.
Divide with a knife crosswise for one fourth spoon.
Divide with a knife crosswise for one eighth.

TEMPERATURES USED IN COOKING

Freezing point of water	Fahrenheit 32°	Centigrade 0°
Blood temperature	Fahrenheit 98.6°	Centigrade 37°
Simmering point	Fahrenheit 185°	Centigrade 85°
Boiling point	Fahrenheit 212°	Centigrade 100°

To change a reading of temperature from Centigrade to Fahrenheit, multiply Centigrade temperature by 1.8, add 32°, which will give the equivalent temperature in Fahrenheit.

The coagulation temperature of proteins is from 158°–167° F.

The gelatinizing temperature of starch is from 149°–185° F.

The high temperatures, when used, are to develop flavor.

Ferments are destroyed at temperatures above 160° F.

Rules for Dishwashing. — To wash dishes plenty of hot water is needed, also a dishpan, rinsing pan, dishcloth, wire cleaner for pots and pans, a soap shaker, brush for silver and glass, scouring board, cork and flannel, sapolio, soap, and clean, dry dish towels.

After the dining room table is cleared, collect knives, forks, and spoons.

Scrape all crumbs, scraps, and dough into a waste jar.

Wipe greasy dishes out with soft paper so that they will not make the dishwater greasy.

Dishes with egg adhering should be soaked in cold water, as the hot water cooks the egg and makes it difficult to remove.

Rinse with cold water glasses and bottles that have held milk.

Empty the tea and coffee pots.

Put all pans and kettles to soak in hot water so that they will clean easily.

Pile all dishes of a kind neatly together.

Have the dishpan half full of hot, soapy water, the rinsing pan half full of clear hot water.

For ease and rapidity of work, place the soiled dishes on the extreme right of the work table, the dishpan to the left of the soiled dishes, the rinsing pan to the left of the dishpan, and then place the clean dishes to the left of the rinsing pan.

Wash the glasses first and dry at once, then wash silver, cups, saucers, plates, etc., taking the cleanest first, rinsing and drying thoroughly.

Scour the knives when necessary.

Wash the tea and coffee pots with clean, hot water and dry them.

Lastly, wash the tins and cooking utensils, scouring, if necessary, with powdered sapolio applied with a cork or flannel.

Do not put boiling water on glasses or china.

Do not put wooden handles or the cogs of Dover egg beaters into the water.

Never leave the soap in the sink or dishpan.

When all the dishes are washed and wiped, pile the different kinds together and put into place.

Empty the dishpan, wash the dish towels in warm suds, rinse, and hang to dry.

Wash the table, soap dish, and sink in warm suds.

Wash both dishpan and rinsing pan with hot suds, rinse with clear water, and dry thoroughly with a dish towel.

Wash the dishcloth, rinse, and hang to dry.

The daily care of the sink consists in keeping it free from grease and scraps, scrubbing it thoroughly, and keeping it dry when not in use. In addition to this, at least once a week, pour a hot, strong solution of sal soda down the waste pipe to wash off all the grease that may have cooled and settled in the pipe. Follow this with plenty of hot water. If this is done, waste pipes will not become clogged with grease. All sinks should have a strainer screwed down over the waste pipe, and no tea leaves, coffee grounds, burnt matches, or potato parings should ever be put in the

sink. A garbage pail should be kept for that purpose. This pail should be washed daily with a solution of sal soda and dried and placed in the sunshine when possible.

Fire and Firemaking. — The success of cooking depends upon the application of the right amount of heat to the right combination of foods, so a study of fire making and fire regulation is necessary to produce the best results. Cooking at the wrong temperature injures the food and often unfits it for use. It is said that the baking of bread or cake is two thirds of the making. At any rate, both are spoiled by too slow or too fast an oven. Much fuel is wasted because the application of the right amount of heat is not understood or is neglected.

To have a good fire we must have a good stove, a good fuel, and some means of raising it to its kindling point, and must be able to secure a good supply of air to make the fire burn. By the kindling point is meant the temperature at which a thing takes fire. Some substances, like phosphorus, matches, paper, gas, and gasoline, have a low kindling point and take fire rapidly. Some, like hard coal, have a very high kindling point and some other fuel must be used as kindling before a coal fire can be started. The smaller the pieces of fuel, and the more loosely packed, so that air can surround them, the more easily will the fire kindle.

Soft wood makes excellent kindling, and in some localities, where wood is plentiful, both hard and soft wood are used as fuel. Gas is almost universally used for cooking in cities, at least during the summer months. It is cheaper, if properly handled, than wood or coal, cleaner, and gives off less heat. Some form of oil is used in rural communities during the summer for the same reason that gas is used in the cities, and denatured alcohol is used in some local-

ities. Both hard and soft coal are used during the winter for heating and cooking purposes. Coal makes an excellent fire for cooking, as it is easily regulated, supplies uniform heat, and requires very little attention when once started. Electricity is an important source of heat.

Parts of a Stove or Range. — Most ranges or stoves are so made that they will burn either wood or coal, the only change necessary being the adjustment of the grate.

The parts of a range are: —

1. *A fire box,* lined, so as to control the heat and conduct it where it is needed.

2. *A grate* at the bottom of the fire box, usually reversible, so as to burn either wood or coal, and so made as to allow the ashes to pass through.

3. *An ash pan* below the fire box; should be emptied daily.

4. *Dampers, checks, and drafts,* for the purpose of admitting air and controlling and regulating its supply. The draft in the fire box is for the purpose of admitting air when starting the fire, or to make the fire burn faster. When closed it checks the fire. The damper in the chimney should be partially closed after the fire is started to prevent loss of heat. It should never be closed so tight that the smoke cannot escape. The oven damper partially closes the opening into the chimney and forces the heated air to pass around the oven, thus heating the oven.

5. *An oven,* used for baking purposes. It must be kept free from soot, above and below, so that the air can circulate freely. If this is not done, the food will burn on the top or bottom or will not bake evenly.

6. *Stovepipe,* to allow air and smoke to pass through.

7. *Water front* — connected with water tank in kitchen to heat water. (Not always used.)

8. *Warming oven*, to keep dishes warm.

Pupils should become familiar with all parts of the stove and get enough practice in baking so as to understand the regulation of the oven and know what temperatures are best for the various foods.

How to Build a Fire. — Remove the covers from the top of the stove and brush the soot and ashes into the fire box. Clean everything out of the fire box by shaking the grate so the ashes will fall into the ash pan. Place crumpled newspaper, shavings, or small pieces of soft wood in the bottom of the fire box; then put in some soft wood, then hard wood, arranged loosely so that the air can pass through. Place the wood so it reaches the corners of the fire box and is not massed in the middle. Open the dampers in the fire box, chimney, and oven, and then light the fire. Apply the match to the substance that will kindle quickest. The fire should be lighted at the bottom so that the flame will ascend. As the fire burns freely, put on more fuel, but the fire box should never be more than three fourths full. When the fire is well started close the front draft, partially close the chimney draft, and if the oven is to be used close the oven draft.

Ashes should be emptied every day. If left in the stove until they fill the ash pan and touch the grate at the bottom of the fire box, they destroy the grate.

The oven should be kept clean. If anything has boiled over and burned on the bottom of the oven, it should be scraped off with an old knife.

The best time to black the stove is while the fire is starting. Use very little blacking, but brush it thoroughly over all parts of the stove. A steel range requires no blacking, simply washing.

Suggestions for Cooking with Gas. — 1. See that the stove is kept clean.

2. Keep the burners free from grease, dust, and dirt.

3. To light a burner, open the valve leading to the burner to be used, allow the gas to flow a second, and then apply the match.

4. To light the oven, apply the lighted match to the oven pilot and then turn on the gas. If the gas is turned on too long before it is lighted, there is danger of an explosion. For the same reason the oven door should be opened before the pilot is lighted.

5. Never leave a burner lighted because you are going to use it soon; when the gas is not in use, turn it out, and light it again when needed. Matches are cheaper than gas.

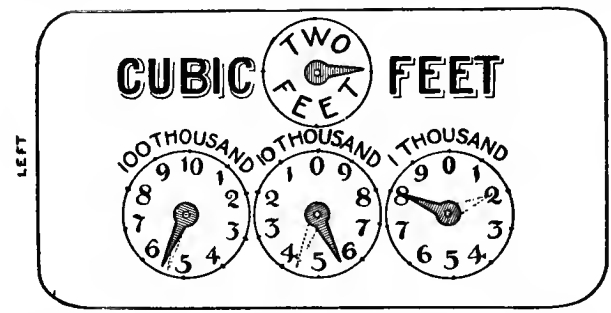
6. Never light a burner until you are ready to use it. As soon as the food begins to boil, turn the gas as low as possible. Food is cooking just as fast when it is bubbling slightly as when it is boiling over the top of the kettle, and there is less danger that it will burn. Food tastes better cooked in this way. After food has started to cook, it is almost impossible to use too little heat; foods are spoiled by the use of too great heat and gas is wasted. When you waste gas, you are burning money that could be used to purchase food or clothing.

7. When baking bread, put the bread in the cold oven, light the gas and let the oven heat slowly for the first ten minutes, increase the heat for the next fifteen minutes, and then finish baking at a moderate temperature.

8. Learn to read your gas meter, for if properly handled and looked after, gas is more satisfactory to cook with than wood or coal and more economical.

Directions for Reading a Gas Meter. — The small dial marked *two feet* is not to be considered. It is used for testing purposes. Each *figure* on the right-hand dial indicates 100 cubic feet; on the middle dial each *figure* indicates 1000 cubic feet; and on the left-hand dial each *figure* indicates 10,000 cubic feet.

When meters are new all pointers are at 0, but never again are in this position until exactly 100,000 cubic feet have been passed. Read from left dial to right, *always*



taking the figures which the pointers have passed. For example: Suppose you find the pointers on your meter as shown by the heavy lines on the above cut, you record 55,800. At the previous reading, one month before, assume that the pointers were as shown by the dotted lines, 54,200. This means that during the month your gas consumption sent the pointers from 54,200 to 55,800. You have consumed the difference, which is 1600 cubic feet. Your gas bill would then be written as follows:

State of Meter, last reading	55800
State of Meter, previous reading . . .	54200
Amount consumed	1600
At $1.10 per M	$1.76

Temperature of the Oven. — Many ranges and stoves now on the market have an oven thermometer or heat regulator on the oven door. If the indicator would show whether the oven is slow, moderate, or fast, with any degree of accuracy, direction could be given in all recipes as to the amount of heat needed and it would not be necessary to open the oven door and test the heat. No oven thermometer that is even fairly accurate, or that can be relied on, is on the market as yet, and the only reliable tests for oven temperature are the old ones, which must be learned by experience. Probably the best way to test the heat of the oven is the hand test. This is done by putting the forearm in the oven and holding it there long enough to ascertain whether the air in the oven is moderately hot, very hot, or what may be termed cool. The terms used to distinguish the different oven temperatures are slow, moderate, hot or fast, and very hot. Generally speaking most foods are best cooked at moderate heat. A good general rule is, the smaller the article to be baked the hotter the oven, or the larger the article the slower the oven. This does not apply in all cases, but the reason for it is that it takes a long time for heat to penetrate to the center of a large mass. If intense heat be applied, a crust forms and the heat does not reach the center readily.

Another way to test the oven temperature is by the use of paper, or bread crumb. The length of time it takes the paper or bread to brown determines the degree of heat in the oven. In a hot oven a piece of white letter paper will turn to a yellowish brown in from three to five minutes, in a moderate oven it will turn to a yellowish brown in from seven to ten minutes, and in a slow oven it will turn to a yellowish brown in from twelve to fifteen minutes.

EQUIPMENT FOR A SCHOOL KITCHEN FOR A CLASS OF SIXTEEN PUPILS

I. 8 double or 16 single work tables, with drawers to hold the utensils necessary for the average lesson, and with molding boards, and attached seats.

II. 16 individual gas stoves or burners attached to the tables, or if gas is not in use 16 individual or 8 double burner oil stoves. (See frontispiece.)

III. One large gas oven, or range, or a coal or wood range with a large oven, so that each pupil may have practice in attending to the baking for the class a week at a time or longer. In this way she may know exactly how to manage the range in her own home. She cannot get this practice if nothing but the small individual ovens are provided.

IV. A sink containing hot and cold water faucets. A gas heater may be installed or a water front may be placed in the range, or hot water may be provided by passing water pipes through the furnace and placing a storage tank near. Some arrangement is necessary for providing hot water because the time of teacher and pupils is lost and fuel is wasted if dish water is heated in individual tea kettles and it is a return to primitive conditions.

V. A common kitchen table where the day's supplies are placed in readiness so that no time is lost in getting to work.

VI. A refrigerator.

VII. Screens for every window in the kitchen.

VIII. An arrangement for drying dishcloths and wiping towels, as rods on the back of the tables.

IX. Shelves or cupboards for utensils.

X. A wheeled supply table, a great convenience, though not essential.

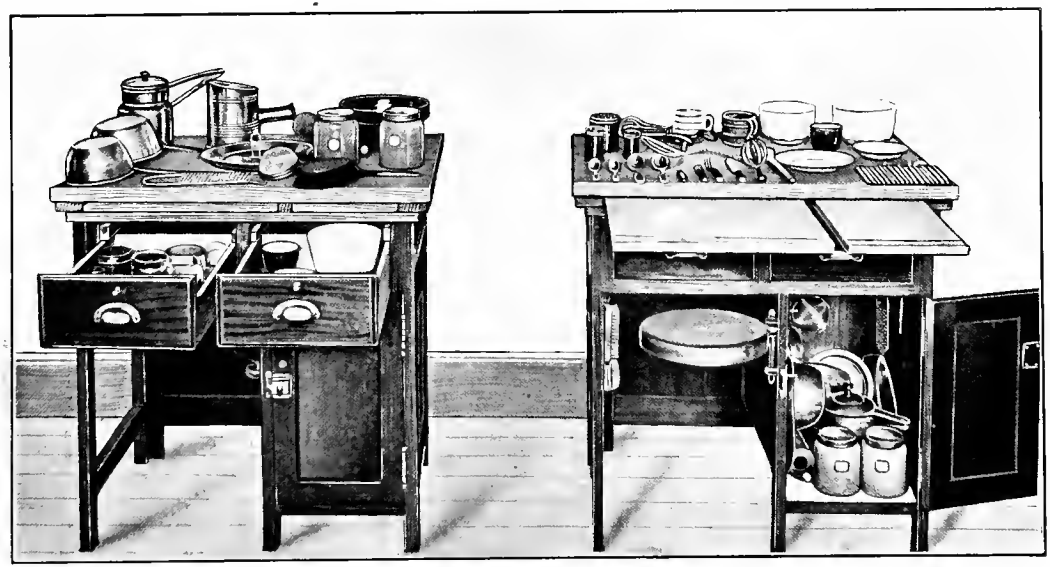
List of Utensils for the Individual Work Tables

16 paring knives.
16 spatulas.
16 plated silver or steel knives.
16 plated silver or steel forks.
16 tablespoons.
32 teaspoons.
16 small wooden spoons.
16 Dover egg beaters.
16 spoon egg beaters.
16 one-quart mixing bowls.
16 sieves to fit bowls.
16 glass measuring cups.
16 tin measuring cups.
16 custard cups.
16 utility pans.
16 small tin basins about $5\frac{1}{2}$ or $6\frac{1}{2}$ inches in diameter for baking purposes.
32 small enameled basins about $5\frac{1}{2}$ or $6\frac{1}{2}$ inches in diameter.
16 small pie plates about $4\frac{1}{2}$ or $5\frac{1}{2}$ inches in diameter.
16 one-quart double boilers.
16 one-quart stewpans; covers.
16 small rolling pins.
16 small biscuit cutters.
16 small frying pans.
16 small bread pans.
16 small dishpans.
16 vegetable brushes.
16 corks.
16 small boxes for salt.
16 small boxes for pepper.
16 boxes for sugar.
16 boxes for flour.
16 cans for baking powder.

Note. — If the work table drawers are small, the utensils not in constant use may be kept in the utensil cupboards.

Additional Utensils for General Use

16 salad or pie plates.
16 breakfast plates.
16 cups and saucers (tea size).
16 water glasses.
8 small teakettles.
8 apple corers.
8 small graters.
8 four- or six-cup muffin pans.
8 two-quart bowls.
8 mixing bowls.
8 doughnut cutters.
8 assorted cooky cutters.
8 trays, assorted sizes.
8 pie tins.
8 two- or three-quart granite or enameled pans.



INDIVIDUAL COOKING TABLES.

Contents of the cupboard are shown on top of table at left. Contents of the two upper drawers are shown on top of table at right. The open door and drawers show the equipment in place. Note the swinging stool which may be pushed out of the way, also the molding and cutting boards.

8 small lemon squeezers.
8 match boxes.
8 soap dishes.
4 two-quart enameled pails, with covers, for holding scraps until they are transferred to the garbage can.
4 one-quart measures.
4 small colanders.
4 granite kettles.
4 steamers (size of kettles).
4 kettle covers.
4 meat forks.
4 wire pot cleaners.
4 broilers.
4 long-handled skimmers.
4 dripping pans (size of the oven).
4 roll pans.
4 angel or sponge-cake pans.
4 layer cake pans.
4 sheet cake pans.
4 loaf cake pans.
4 small chopping bowls.
4 small chopping knives.
2 two-quart ice cream freezers.
2 large graters.
2 sink scrapers.
2 large frying pans.
2 two-quart coffeepots.
2 teapots.
2 potato mashers.
1 large teakettle.
1 set timbal irons.
1 flour sifter.
1 dipper.
1 butcher knife.
1 bread knife.
1 cake knife.
1 carving set.
1 potato ricer.
1 flour bin.
1 two-quart double boiler.
1 meat knife.
1 pudding mold.
1 quart pitcher.
1 two-quart pitcher.
1 meat chopper.
1 large garbage can.
1 kitchen scale.
1 dustpan.
1 waffle iron.
1 funnel.
1 corkscrew.
1 can opener.
1 small paint brush.
1 brush broom.
1 stove brush.
1 broom.
1 hamper for soiled towels.
50 yards of crash for dishcloths and dish towels.
16 holders.
500 paper napkins.

Articles Needed if Pupils are to Learn to Serve Meals

Dining-room table.	Napkins.	Silverware.
Dining-room chairs.	Doilies.	Glassware.
Tablecloths.	Lunch cloths.	A set of dishes.

CHAPTER II

CLASSES OF FOOD. REASONS FOR COOKING

Introductory. — Very few people ever think of the real reason why they must eat. Probably the only time they are forcibly reminded of it is when they are suffering from some sickness that burns up the tissues and they lose weight. At such times they loathe any food, but are compelled to eat certain foods prescribed by the doctor, so that the body may gain strength to fight the disease.

Boys training in athletic sports learn that they must avoid eating too much or they will gain weight and be unable to perform their feats with agility. They also learn what foods are best to develop muscle.

Every one knows that children who are underfed or improperly fed have no energy for work or even play, and that such children are often stunted in mind and body.

Food, then, must have other uses than to please the taste or satisfy the appetite. Important though these uses are, they are merely Nature's ways to get us to take what we need to keep our bodies strong, healthy, and well developed.

Food Defined. — Food is defined as any substance which, when taken into the body, supplies it with heat or energy or builds tissue.

Energy is stored or latent in all organic substances; and when they are burned, the energy is released as heat. Heat is a form of energy.

All foods contain latent energy; and when they are oxidized, produce heat. Their energy then may be used to keep the body warm or to keep up its various activities. In much the same manner the energy in coal heats the passenger coaches of a train and furnishes the power for the engine which pulls the train.

The body in health is maintained at its normal temperature, 98.6° F., even in the coldest weather, by the oxidation or burning of the food taken in, and not by stove or furnace heat from the outside. In cold weather houses are kept warm and warm clothing is worn so that the body will not lose so much heat to the surrounding air. In summer light clothing is worn so that the body will lose heat.

Energy is needed in the body so that the vital processes, such as digestion, respiration, and circulation, may be carried on, and also for work and muscular activity. Though bodily heat and muscular energy are important, they merely result from cell activity. The blood carries oxygen and food to the cells and by the process of oxidation the old cells are burned. To replace them new cells are built up from the food brought by the blood. Cells and tissues must be constantly oxidized, then rebuilt and replaced, because life results in the continual wearing out of the old, and building up of new tissues, from the food consumed.

Oxidation. — Foods are burned or oxidized in the body just as wood or coal is burned outside of the body, except that they burn without flame. They produce, practically, as much heat when burned within the body as they would produce if burned outside the body, and because of this fact we have a means of finding out just how much heat

the various foods yield. The burning of foods and cells in the body is called oxidation and constitutes the vital process called life. The old cells are oxidized and new ones are built up from the food eaten. The foods, by burning, yield heat and energy. Some foods do not contain the substances or elements needed to build tissues, but they will burn in the body and produce heat and energy.

Foods must contain nitrogen to be able to build tissue. Foods that contain carbon will yield heat and energy.

Foods Classified. — Foods are classified into five classes: proteins, fats, carbohydrates, mineral matter, and water, though some food substances do not properly belong in any of these classes.

Proteins contain carbon, hydrogen, oxygen, and nitrogen.

Fats contain carbon, hydrogen, and oxygen.

Carbohydrates contain carbon, hydrogen, and oxygen.

Water contains hydrogen and oxygen.

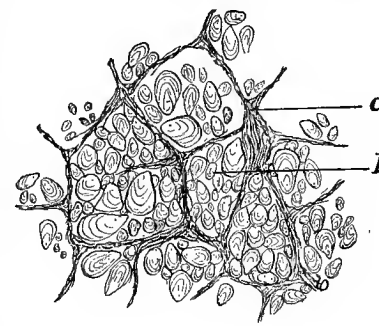
Mineral matter consists of compounds of iron, calcium, potassium, sodium, magnesium, sulphur, phosphorus, chlorine, and fluorine. These are associated with the proteins and carbohydrates in the various tissues and fluids of the body.

Proteins, mineral matter, and water build tissue; carbohydrates, fats, and proteins yield heat and energy.

Foods are also classified as animal and vegetable foods because of the sources from which they are derived. Examples of vegetable foods are potato, carrot, wheat, rice, peas, apple. Examples of animal foods are meat, fish, eggs, milk, cheese.

Structure of Foods. — All foods are similar in structure in that they are made up of innumerable cells held together by some intercellular substance. Each cell consists of

two, sometimes three, parts — nucleus, protoplasm, and cell wall. Every cell has a nucleus or center of life from which the cell grows and produces other cells. Surrounding the nucleus is the protoplasm or nourishment of the cell. It supplies the material needed for the growth and development of the nucleus. It consists of protein, mineral matter, and water, as does also the nucleus. Protoplasm is more or less granular and forms a sort of network that may enclose other substances, as starch or fat. All vegetable cells, and some animal cells, have a cell wall. The walls of animal cells consist of a substance called connective tissue. This substance also holds the cells together. The cell walls of vegetable cells consist of a substance called cellulose. It is similar in composition to starch, but unlike it in structure. When it is old, it sometimes turns to wood. The human stomach cannot digest cellulose, and so it must be softened by cooking to allow for the digestion of the starch or fat which it encloses. Cellulose is of value, however, in that it furnishes bulk.



A THIN SLICE OF POTATO (magnified).
a, albuminous pockets; *b*, starch grains in the pockets. (From Overton's *Applied Physiology*.)

NOTE TO TEACHER. — If it is possible to secure a microscope, study may be made of the starch cell in potato. The amœba may be studied under the microscope to show the parts of the single cell. The yeast cell also furnishes a good study. It would be well for pupils to make a drawing of what they have observed.

Experiment for Pupils. — Scrape the pulp from a small piece of round steak until the white fibrous substance shows distinctly. This substance is connective tissue.

Grate a potato, place it in a cheesecloth bag, and wash until all the starch is washed out. Dry the substance left in the bag and examine it. This substance is called cellulose.

CLASSES OF FOOD

I. Carbohydrates.

1. Starch, as in potato, rice, corn, and all vegetable foods.
   Insoluble in cold water.
2. Sugar — cane, beet, maple, malt, fruit.
   Soluble.
3. Cellulose — cell walls of plants.
   Insoluble.
4. Pectin — found in fruits and some vegetables. Causes juice to gelatinize. Occurs also as pectose which is changed to pectin by the action of a ferment.

II. Vegetable Acids.

1. Malic, oxalic, citric, tartaric. Decomposition products of starch or sugar. They are decomposed in the body, forming alkaline carbonates, and help to preserve the alkalinity of the blood.
   Soluble.

III. Proteins.

1. True proteins.
   Coagulated by the heat or acid or ferment. Some are soluble in cold water, some in diluted salt, acid, or alkaline solution; some are insoluble.
   Albumin as in egg. Casein as in milk. Myosin as in meat. Fibrin as in meat. Gluten as in wheat. Legumin as in peas and beans.
2. Albuminoids.
   Softened by moist heat and hardened by dry heat. Soluble in boiling water. Ossein in bone, elastin in cell walls, collagen in connective tissue.

3. Extractives. Soluble in water. They are the flavor in meat juice and in some vegetables.

IV. FATS.

1. Fixed fats. Softened by moderate heat, separated into fatty acid and glycerine by strong heat. Examples: butter, lard, olive oil.
2. Volatile oils. Found in orange and lemon skins, onions, etc. Soluble and volatile.

V. MINERAL MATTER.

1. Lime in milk, sulphur in eggs, phosphorus in wheat.
   In proteins, sulphur, phosphorus, and iron.
   In vegetables, potassium, sodium, magnesium, calcium.
   Common salt.

VI. WATER.

Necessity for Cooking. — Nature supplies us with the things needed to keep us alive, namely: — air, water, food, and heat, but they are not always in the form most acceptable to man.

Air is made impure by factory smoke, by crowding human beings so closely together that enough oxygen is not obtainable, and by disease germs given off in various ways from the bodies of those afflicted with disease. Those who wish to enjoy health should seek always to work and live where there is an abundance of fresh air.

Water may contain disease germs; evidences of pollution which affect color, taste, and odor; or organic impurities: then sterilization or filtration becomes necessary to fit it for use.

Foods are supplied by nature to us in great abundance, but most foods require some cooking before they are ready for consumption. Prehistoric man may have lived on uncooked foods, but even the savage tribes of to-day

have some means of cooking their food, crude though it may be.

Reasons for Cooking. — Cooking may be defined as the preparation of foods for the table by means of heat. Several good reasons can be given why food should be cooked.

1. Cooking makes food more attractive and palatable because it changes the appearance of the raw food and develops flavor.

2. It kills bacteria present in some foods which would bring about undesirable changes in the food itself, or by entering the body through the food cause certain diseases.

3. Heat brings about physical and chemical changes in the food which make it more digestible, such as the softening of cellulose in vegetables, connective tissue in meats, and the cooking of starch.

Primitive Methods of Cooking. — Probably the first method of cooking used by the savage or uncivilized tribes was that of drying the food in the sun. This was also a method of preservation so that the food might be stored away for use in times of scarcity. The next method was, doubtless, that of roasting before the open fire or by baking in hot ashes. Then came the construction of some crude vessels, the dropping of hot stones into the vessel which contained the water in which the food was to be cooked. By this method meat was simmered and boiled. Later came the construction of vessels that could stand the heat and be placed directly over the fire. Lastly, a primitive oven was made, and from these crude methods of roasting, baking, boiling, and stewing, were evolved and developed those in use at the present time.

METHODS OF COOKING

All methods of cooking may be grouped in five classes: —

1. Cooking Directly over the Fire.
   (*a*) Broiling: over coals or gas or in a sizzling hot pan.
   (*b*) Roasting: before the fire. Wasteful of food and fuel.
2. Cooking by Heated Air.
   (*a*) Baking: cooking in an oven. Also called roasting.
3. Cooking in Heated Water.
   (*a*) Boiling: cooking in water at temperature of 212° F.
   (*b*) Stewing: cooking in small quantity of water at a temperature below 212° F.; better than boiling.
   (*c*) Steaming: cooking in vessel surrounded by steam or cooking food in steam.
4. Cooking in Heated Fat.
   (*a*) Frying: cooking in deep fat.
   (*b*) Sautéing: cooking in small quantity of fat.
5. Cooking in a Fireless Cooker.
   Cooking for several minutes on the stove and then placing the food in the fireless cooker. Foods are cooked a much longer time in the fireless cooker than by direct heat.

All other methods of cooking are a combination of some of the above methods. Braizing is sautéing, stewing, and baking, and is applied to meat. Fricasseeing is stewing, and frying or sautéing.

Principles of Cooking. — The principles of cooking are few in number and easily mastered; their proper application controls the success of every article of food prepared, from the simplest to the most intricate. Cooking is a scientific process. It depends for its results on the application of principles, and when these are understood and applied, the results will be as certain as those of any other chemical or physical process subject to natural laws.

These principles could be grouped as follows: —

1. Those which govern the cooking of proteins and show the effect of heat on them.
2. Those concerned with fats.
3. Those concerned with carbohydrates, — starches, sugars, cellulose.
4. Those concerned with extractives, volatile oils, and mineral matter.
5. Those which render foods sterile.

Solubility and Insolubility. — Substances are said to be soluble or insoluble in water. The term *soluble* commonly means that the substance can be dissolved in water; if insoluble, it cannot be dissolved in water. Substances in foods that are soluble in water may be lost during cooking. Some soluble substances are hardened or coagulated by heat and rendered insoluble. Some food substances are insoluble in water, but are soluble in a dilute salt, acid, or alkaline solution.

Ferments. — A ferment is a substance which brings about a chemical change in a food, but remains unchanged itself. Each ferment acts only as a single substance. It may coagulate the substance and render it insoluble, as in the action of rennin on casein in milk, or it may break the substance down and render it more soluble, as in the ripening of cheese. Ferments play an important part in the ripening, maturing, and decay of foods. They bring about the changes in digestion. They change starch to sugar, and break down cellulose. They bring about the coagulation of milk and blood. We are only just beginning to know their importance in all vital processes. Heat destroys ferments. A temperature of 149°–160° F. renders both animal and vegetable ferments inert.

WHY COOKING IS TAUGHT IN SCHOOLS

Cooking is taught in schools so that pupils may learn to plan, cook, and serve meals, and to know the nutritive value of the different foods and their place in the diet so that the body will be properly nourished.

Good cooking is important. It is probably the first requisite necessary to make a food of value to the body; for though a food may be balanced in nutritive value, if it is served in an unappetizing way it will not be eaten. The sight and taste of attractively served and prepared foods stimulate the appetite and cause secretion of digestive juices, which naturally aids digestion. However, foods having little nutritive value may look as attractive as those of high nutritive value; and if a study is not made of the composition of foods, we might always select those of low nutritive value and the body would be deprived of proper nourishment.

Foods are analyzed in chemical laboratories and the exact composition of each food is known. United States government bulletins contain very complete tables showing the composition of all common foods.[1]

By examining the tables on pages 189–193 we find the percentage of water, protein, fat, carbohydrates, and mineral matter in the various foods. We also find the percentage of refuse in some foods as sold to the consumer. It is well to note the percentage of refuse in foods, espe-

[1] Bulletin No. 28, Office of Experiment Stations, Washington, D.C., contains tables showing the percentage composition of all foods in use in the average home. Farmers' Bulletin No. 142 also gives the composition of many of the common foods. This bulletin may be obtained free of charge from the United States Department of Agriculture. The tables referred to above are taken from these government bulletins.

cially in meats, because a cut which seems cheap may in reality be dear because of the amount of bone and fat which it contains.

The composition of any food to be prepared should be learned or at least noted, and in this way it will be easy to remember the nutritive value of the different foods and group them in several classes.

Cooking affects digestibility; different methods of cooking bring out different flavors; foods must be served in various ways, as a change in diet is desirable. For these reasons the different methods of cooking are taken up in a series of lessons which develop and show all principles of cooking. When these methods are learned and the principles of cooking mastered, foods having equivalent nutritive values are studied in groups, and the methods and principles of cooking learned in Chapter IV are reviewed.

Methods and principles are few in number, but innumerable applications of these few may be made.

The mastery of principles is the science of cooking; and the serving of foods in attractive, savory, and appetizing ways is the art of cooking.

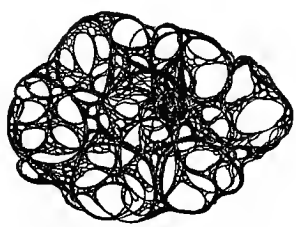
The price of all foods should be known, and the cost of each recipe calculated. Foods should be cooked, in school kitchens, in their proper season, just as they would be served in the home. Eggs should not be served in November, December, January, for two reasons, — because of prices, and because they are apt to be storage eggs. Canning should not be taught when peaches and pears must be purchased by the dozen. Pupils should try all recipes at home, and should have lessons on foods most commonly used in the average home. They should know the place of each food prepared, in the daily diet.

CHAPTER III

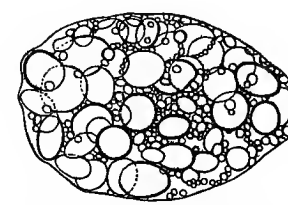
METHODS OF COOKING. DEVELOPMENT OF PRINCIPLES AND THEIR APPLICATION. PRACTICE WORK IN FOODS

BAKING VEGETABLE FOODS. PRINCIPLES WHICH APPLY TO COOKING OF CARBOHYDRATES

All vegetable foods are made up of innumerable cells, so small that they cannot be seen except by the aid of a microscope. These cells are held together by a substance



Protoplasmic Structure of a Flour Cell.
(Farmers' Bulletin, No. 389, U. S. Dept. of Agriculture).



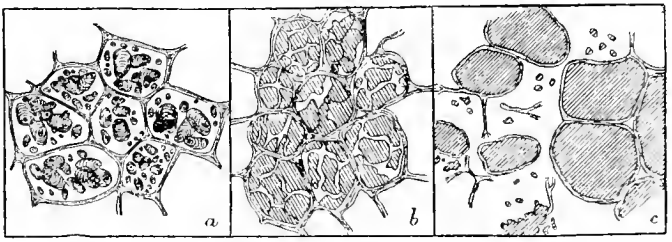
Starch Grains in a Flour Cell.
(Farmers' Bulletin, No. 389, U. S. Dept. of Agriculture.)

called cellulose. Each cell consists of a network of protoplasm which incloses granules of starch or sugar, mineral matter, and water, and is surrounded by a wall of cellulose.

Cellulose is of the same composition as starch, but is unlike it in structure and in appearance; heat and the digestive juices have not the same effect on it that they have on starch. When cellulose grows old, it becomes tough and woody. The human stomach cannot digest cellulose; and as it incloses the starch and other sub-

stances that can be digested if the digestive juices can reach them, these cell walls must be softened by cooking so as to set free the inclosed starch, sugar, mineral matter, and protein.

When the cells contain much starch, moisture and heat cause the starch grains to swell and burst the walls of cellulose which inclose them. Some foods, like potatoes,



CHANGES IN STARCH CELLS IN COOKING.

A, cells of a raw potato with starch grains in natural condition; *b*, cells in a partially cooked potato; *c*, cells of a thoroughly boiled potato. (From Farmers' Bulletin No. 389, U. S. Dept. of Agriculture.)

contain enough water to cause the starch to swell when the water turns to steam, and this causes the bursting of the cell wall. Some foods, like rice, corn, and wheat, are cooked in water; and the starch absorbs water during cooking. When starch is cooked we sometimes say it is gelatinized, and the starch in different foods cooks or gelatinizes at different temperatures. The starch in oats gelatinizes at 185° F., corn at 167° F., potatoes at 149° F., other cereals at 176° F. Some foods, like lettuce, celery, tomatoes, onions, contain so little starch that it is not necessary to cook them, because we eat them, not for the starch in them, but for the cellulose, mineral matter, and acids which they contain, and which have important uses in the body.

In some foods the cellulose is so tough that it must be softened, even though the food does not contain much starch. The greater the amount of cellulose in a food the longer time it takes to cook it. Some foods, like old beets and carrots, are so tough that it is a waste of fuel to try to cook them.

Recipe for Baked Potatoes. — Select smooth, medium-sized potatoes. Wash clean, using a brush to scrub and a knife to remove the specks and blemishes. Place on the grate of an oven of moderate temperature and gradually increase the heat. Bake until soft, about 40 minutes. Break or pierce the skin to allow the steam to escape, and serve in an uncovered dish. A moderate oven is needed in starting to allow the heat to penetrate to the inside of the potato. If the heat is too intense at first, it forms a hard crust on the outside, keeps out the heat, and prevents the potato from cooking evenly throughout. If the steam is allowed to remain in the potato, it condenses and the potato will be soggy.

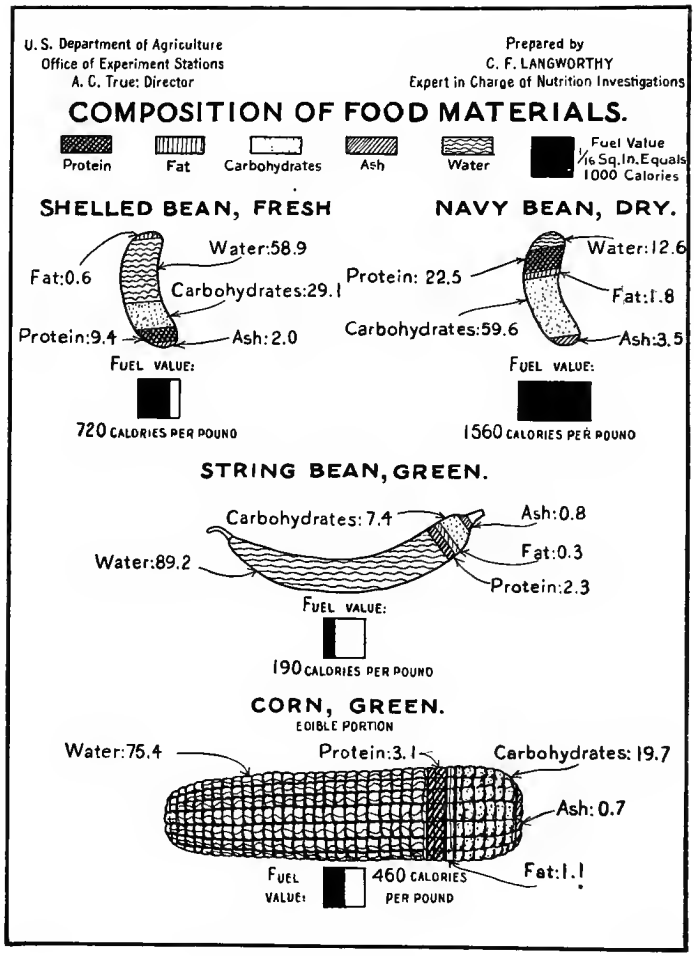
With what would you serve baked potatoes? At what meal?

Potatoes are the most important of all vegetable foods, except wheat, because they are the most extensively used. They contain, after they are pared for cooking: —

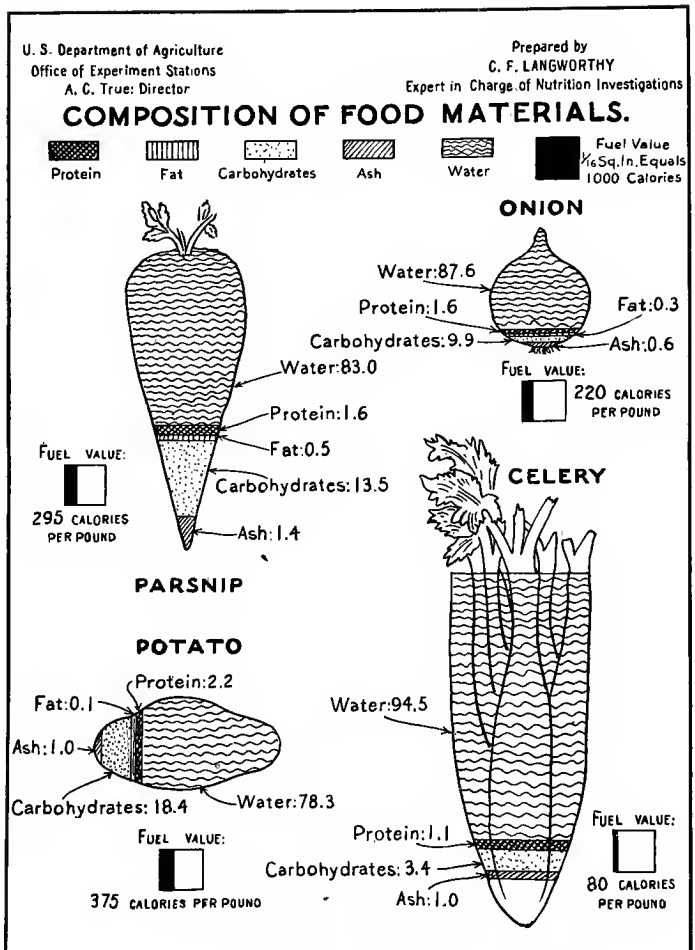
Water	Starch	Cellulose	Protein	Fat	Mineral Matter
78.3%	18%	.4%	2.2%	.1%	1%

NOTE. — Experiments to show composition of potato will be given in Chapter V, page 74, but the teacher may well give the starch test here. A solution of iodine turns starch blue, and pupils may test various foods to detect the presence of starch.

The most important principles involved in the baking of potatoes are those which govern the cooking of starch and the softening of cellulose.



COMPOSITION OF VEGETABLES.



COMPOSITION OF VEGETABLES.

STATEMENT OF PRINCIPLES.

1. Heat and moisture soften walls of cellulose in vegetable foods; the denser the walls, the longer time it takes to soften them.
2. Heat and moisture cause starch grains to swell and burst the walls of cellulose that inclose them, and gelatinize or cook the starch.

Recipe for Baked Apples. — Wash and wipe apples and remove core. Place in a granite pan with one tablespoon of sugar in each apple and add water enough to just cover the bottom of the pan. Bake in a hot oven, about 30 to 45 minutes. Apples containing a great deal of acid cook much more quickly than those that are not so tart.

Calculate cost. When would you serve baked apples? At what meal?

Vegetables differ in the amount of nourishment which they contain. They all contain carbohydrate in some form, though the amount and kind varies. Potatoes, wheat, corn, oats, rice, peas, and beans contain considerable starch. The carbohydrate in other vegetables and fruits is small in quantity, and consists of sugar, pectin, cellulose, and some starch. All vegetables contain mineral salts; fruits contain vegetable acids also. Some vegetables and fruits contain oil, called a volatile oil, because it can be turned to vapor and carried off in steam. All vegetables contain some protein.

Apples contain: —

Water	Protein	Fat	Carbohydrate	Cellulose[1]	Mineral Matter
84.6%	4%	.5%	14.2%	1.2%	.3%

The carbohydrate is in the form of sugar, pectin, and cellulose. Apples also contain a vegetable acid. Some varieties contain more cellulose than potatoes and hence it takes a longer time to cook them. Some varieties contain much more acid than others, and as the acid helps soften the cellulose, those containing the greatest amount of acid bake quickest. As apples contain practically no starch, cooking is not necessary, but cooking softens the cellulose and makes it possible to serve apples in a great variety of ways. As apples ripen the sugar content increases, the cellulose becomes less tough, and the acidity decreases. For general use the ripe apple is preferred.

STATEMENT OF PRINCIPLES INVOLVED.

1. Moist heat softens the walls of cellulose in vegetable foods; the denser the walls the longer time it takes to soften them.
2. Acids soften cellulose.
3. Heat melts sugar.

Recipe for Boiled Onions. — Wash and peel about eight medium-sized onions. Place them in a stewpan, cover with boiling water, and boil until soft, about 40 minutes. If the onions have a strong odor, the water may be changed once or twice during cooking. When the onions are soft, drain the water off and serve with White Sauce.

Calculate cost. At what meal would you serve boiled onions?

Onions contain: —

Water	Carbohydrate	Cellulose[1]	Protein	Fat	Mineral Matter
87.6%	9.9%	.8%	1.6%	.3%	.6%

[1] This cellulose is included in the carbohydrate.

The carbohydrate in onions is mainly in the form of cellulose and sugar. (Test may be made for starch.) Onions contain a volatile oil which gives to them their distinctive flavor. The oil is also soluble in water; much of it is dissolved in the water during cooking as well as evaporated with the steam. If the dish in which the onions are cooking is left uncovered, much of the oil passes off gradually in the steam, and the odor of boiled onions is not as noticeable as when the dish is kept covered and the cover removed occasionally.

STATEMENT OF PRINCIPLES INVOLVED.

1. Heat and moisture soften cellulose.
2. Volatile oil is soluble in water.

Recipe for White Sauce. — Melt two tablespoons of butter, add two tablespoons of flour, and rub them together thoroughly. Add one cup of milk and cook until it thickens, stirring constantly. Add one fourth teaspoon of salt and a speck of pepper. (Thin white sauce is made by using one tablespoon of flour instead of two. Thick white sauce is made by using from three to four tablespoons of flour.)

When boiling water or milk is poured over starch, the starch grains expand and gelatinize or thicken, and tend to stick together and become lumpy. Some substance should be mixed with the starch to separate or surround the particles so that they will have room to expand when boiling water or milk is added later, or when cold liquid is added and the mixture is boiled. Melted fat may be used for this purpose, and the starch and fat should be rubbed together thoroughly so that the fat will surround the starch. As starch is not soluble in cold water, a little cold water or cold milk may be used to separate the starch

grains. If the liquid is used, mix the liquid and starch thoroughly until there are no lumps left, before adding the boiling liquid. In pudding sauces, sugar may be mixed with the starch for the same purpose. (As flour contains so much starch it is often used instead of cornstarch as the thickening agent.)

STATEMENT OF PRINCIPLES INVOLVED.

Heat and moisture cause starch grains to swell and burst the walls of cellulose that inclose them, hence starch is used as a thickening agent.

Recipe for Stewed Apples. — Wash and peel about eight apples. Cut into quarters and remove the cores. Place the apples in a stewpan, add a small quantity of water, about one fourth cup, simmer slowly until the apples are soft. If the apples are tart, it will take 10–15 minutes. When the apples are soft, add sugar, a speck of nutmeg or cinnamon, and one teaspoon of butter.

Some apples contain more water and sugar than others, so the exact amount of water and sugar to use cannot be given. Sugar is added after the apples are cooked because, if it were added sooner, the acid in the apples would change or invert the sugar to glucose, and some of the sweetening power would be destroyed. Glucose is about three fifths as sweet as cane sugar. This reduction in sweetness does not impair the food value of the sugar, however, for cane sugar is changed to glucose in the normal digestive processes.

STATEMENT OF PRINCIPLES INVOLVED.

1. Heat softens cellulose.
2. Acid softens cellulose.
3. Acid inverts or changes cane sugar to glucose.

STEAMING VEGETABLE FOODS. PRINCIPLES THAT APPLY TO COOKING OF CARBOHYDRATES AND VEGETABLE PROTEIN

Recipe for Steamed Rice and Use of Double Boiler. — Fill the lower part of a double boiler one third full of boiling water. Put two quarts of boiling water in the upper part of the boiler, add one half teaspoon of salt and gradually add one cup of rice which has been washed in cold water. Cook until soft, about 20 to 30 minutes, stirring occasionally with a fork. Drain and keep hot until ready to serve. Rice may be served as a vegetable with meat gravy, or as a dessert with cream and sugar, or with sliced fruit, or with date sauce.

Calculate cost.

Recipe for Date Sauce. — Wash, clean, stone, and chop one half pound of dates, add one fourth cup of cold water and one fourth cup of sugar and cook until it thickens, about ten minutes. Serve on the rice, with whipped or plain cream.

In the preceding lessons the effect of heat and moisture on the carbohydrates in vegetable foods has been considered. In addition to carbohydrates, vegetables contain soluble volatile oils, mineral matter, vegetable acids, and a network of protoplasm which is composed of protein, a substance which is hardened or coagulated by heat. Potatoes contain about 2.2 per cent protein; apples contain .4 per cent; onions, 1.6 per cent; rice, 8 per cent.

If vegetables are soaked in cold water, soluble protein, volatile oils, starch, extractives, and mineral matter are extracted in the water. If they are plunged into boiling water and cooked at a temperature about 180° F., the pro-

tein is coagulated, and this framework aids in retaining the starch and mineral matter.

Rice contains: —

Water	Carbohydrate	Cellulose[1]	Protein	Fat	Mineral Matter
12.3%	79%	.2%	8%	.3%	.4%

Unlike potatoes, rice contains but a small quantity of water; and as starch absorbs water during cooking, rice must be cooked in enough water to allow the starch grains to swell. It may be cooked in a small quantity of water and all the water will be absorbed and no nutrients lost. When rice is cooked in this way, it is soft and the grains tend to stick together. When rice is cooked in a large quantity of water and the excess of water is drained off, some of the nutrients are lost in the water, but the grains do not stick together, and they are more easily masticated than in the soft, pasty form.

Statement of Principles Involved.

1. Heat and moisture soften cellulose.
2. Heat and moisture cause starch grains to swell, and burst the walls of cellulose that inclose them.
3. Heat coagulates the protein and this aids in retaining soluble substances.
4. Starch and mineral matter are lost when foods containing them are cooked in a large quantity of water and the water is drained off.

Recipe for Steamed Squash. — Place a steamer over a kettle of boiling water. Place squash, cut into pieces, in the steamer and steam until soft, about 30 or 40 minutes. Scrape the squash from the rind, flavor with butter, salt, and pepper, and serve.

[1] The cellulose is included in the carbohydrate.

Steaming in a steamer is a better method of cooking vegetables than cooking in boiling water, because there is no loss of nutrients.

At what meal would you serve steamed squash? What other vegetables serve a similar place in this meal?

Squash contains: —

Water	Carbohydrate	Cellulose[1]	Protein	Fat	Mineral Matter
88.3%	9%	.8%	1.4%	.5%	.8%

Squash contains so much water that it may be baked, or steamed, or boiled. It contains very little starch.

TOASTING BREAD. PRINCIPLE WHICH APPLIES TO STARCHY FOODS

Recipe for Toasting Bread. — Cut bread in even slices one half inch thick. Place in a broiler or toaster and hold over the fire at a sufficient distance to brown without burning; turn once. The dextrin produced by this process is more easily digested than the original starch.

STATEMENT OF PRINCIPLE INVOLVED.

Dry heat at 320° F. changes starch to dextrin.

SAUTÉING FOODS. PRINCIPLES WHICH APPLY TO FRYING FOODS CONTAINING PROTEIN AND CARBOHYDRATE

Recipe for Codfish Balls. — Remove the skin and bones from one cup of codfish and cut it into small pieces. Wash the fish in cold water; add two cups of raw potatoes also cut into small pieces. Put into a saucepan, cover with boiling water, and cook until the potatoes are done. Drain,

[1] The cellulose is included in the carbohydrate.

mash, add a speck of pepper, one tablespoon of butter, and one egg slightly beaten. Place enough fat in the frying pan to cover the bottom, about one tablespoon, and heat until smoking hot. Drop the mixture by tablespoons into the frying pan and fry until brown, turn once.

Calculate cost. At what meal would you serve codfish balls?

Eggs contain: —

Water	Fat	Protein	Mineral Matter
73.7%	10.5%	14.8%	1%

STATEMENT OF PRINCIPLES INVOLVED.

Heat hardens or coagulates the protein in the egg and this holds the different substances together so that they form a ball. When protein hardens, it forms a crust which aids in retaining juices and flavors and prevents the article from soaking fat.

Recipe for Frying Bacon. — Cut bacon in very thin slices. Put it in a moderately hot frying pan and cook until crisp. Do not have the heat strong enough to decompose the fat.

Bacon contains: —

Water	Protein	Fat	Mineral Matter
18.2%	10%	67.2%	4.6%

Bacon is composed mainly of cells of fat. Like all animal cells, the cell walls are of connective tissue, — a form of protein, — and the cells are held together by connective tissue. Moderate heat melts the fat and it escapes from the cell walls, the connective tissue remaining. If strong heat is used, the fat is decomposed into two substances, fatty acid and glycerine.

At what meal is bacon served? Name some foods fried with bacon. Name some foods served with bacon.

STATEMENT OF PRINCIPLES INVOLVED.

1. Moderate heat frees fat from the cell walls which inclose it.
2. Strong heat separates and decomposes fat into fatty acid and glycerine.

FRYING FOODS

RULES FOR DEEP FAT FRYING.

1. The temperature of fat should be high enough to prevent the articles from soaking up the fat and hot enough to brown a piece of bread in one minute.
2. Sufficient fat should be used to entirely cover the articles to be fried.
3. Articles should not be wet, nor ice-cold, and should be rounding or oval in shape.
4. Foods which do not contain egg should be dipped in egg and crumbs or flour to prevent absorption of fat.
5. All foods, after frying, should be drained on soft paper to absorb the grease.
6. Fat bubbles when it contains water. It cannot be heated higher than 212° F. until all water is evaporated. When it has ceased to bubble and is smoking hot, try it with a piece of bread.

The best fat for frying is one that has a high burning point. The burning point of the various fats are: Olive oil, 608° F.; lard, 392° F.; drippings, 336° F.; beef, veal, and mutton, 302° F.; butter, 265° F. Several good commercial products, made from vegetable fats, are on the market. They have a high burning point.

When fat burns, it decomposes and is irritating to the walls of the stomach when eaten.

Recipe for Saratoga Chips. — Wash and pare two medium-sized potatoes. Slice lengthwise in thin slices and cover with cold water until ready to use. Drain, cover with boiling water, and boil two minutes to partially cook the starch. Drain again, pour cold water over, and then dry as thoroughly as possible because water lowers the temperature of the fat. Fry in deep fat and keep the potatoes in constant motion so that they will fry evenly. Drain on paper that will absorb the excess fat and then sprinkle with salt.

Calculate cost. At what meal do you serve Saratoga chips? Are they a cheap food?

BROILING ANIMAL FOOD. PRINCIPLES WHICH APPLY TO THE COOKING OF PROTEINS — TENDER MEAT

Meat consists of bone, fat, and muscle fiber. The bone and fat form but a small part of the meat as it is prepared for the table, though they are purchased with it at the market. The part of meat that is usually prepared and eaten is the muscle fiber.

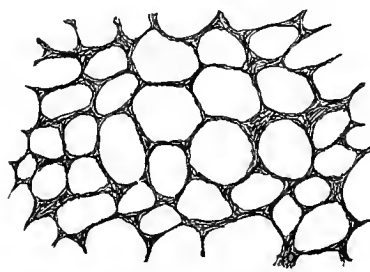
Muscles, or muscle fiber, consist of cells held together by a substance called connective tissue. All substances, whether animal or vegetable, are made up of cells that are alike in structure, but different in composition. An animal cell, like a vegetable cell, consists of a network or protoplasm, and a nucleus, or life center. The nucleus and protoplasm are sometimes surrounded by a cell wall. The nucleus grows, divides, and produces other nuclei, and these in turn become new cells. The nucleus gets its nourishment for its growth and reproduction from the protoplasm;

the protoplasm gets it from the blood. The protoplasm, then, must contain all the substances that are needed for the building up and growth of muscles and other tissues.

The protoplasm and nucleus in animal cells consist of protein, mineral matter, extractives, and sometimes fat.

Animal cells are held together by a substance called connective tissue. It is called a protein, but it does not build tissue, and heat does not affect it in the same way that it affects other proteins.

Extractives are the flavor in meat. They are formed by the breaking down of proteins during muscular exercise. They are soluble in water; and if meat is placed in a cool or slightly warm pan and allowed to heat slowly, extractives are drawn out, and the meat will be dry and tasteless.



FAT TISSUES (magnified).
Connective tissue cells form pockets in which the liquid fat is stored.

Recipe for Broiling Meat. — To broil steak in a broiler it is necessary to have glowing coals without flame or smoke. It is nearly impossible to always have such a fire, and a pan broil is equally good and always possible. The best cuts for broiling are porterhouse, sirloin, and short steaks. The next best are chuck and round steaks. The cuts should be at least one inch thick.

Have the frying pan smoking hot, rub it lightly with a piece of suet from the meat, and then remove the suet so that no fat remains in the pan. Place the steak in a pan and turn it when one side is seared. Turn it often to pre-

vent burning. Steak is broiled from 8 to 10 minutes, the time depending upon the thickness of the steak and individual taste as to rareness. Remove the steak from the pan, sprinkle with salt and pepper, and spread with butter or pour the juice from the pan over the meat.

The pan is hot in starting to sear over the outside and retain the juices. If the pan is not hot enough, the juices will escape, and the meat will be tasteless. Meat is turned often to prevent burning, to prevent juice from escaping from the exposed side, to secure even cooking throughout.

Calculate cost. How many people would the steak serve? Is steak a cheap meat? Give your reason.

STATEMENT OF PRINCIPLES INVOLVED IN BROILING STEAK.

1. Heat hardens or coagulates protein so that it will form a crust, and this crust aids in retaining juices and flavor.
2. Heat and moisture soften and dissolve connective tissue, and dry heat hardens it.
3. Extractives are soluble in water.
4. Some proteins, as albumin, are soluble in water.

Experiments to indicate the presence of protein.

1. Mix egg white with a little cold water. Shake well. Does it dissolve? Heat to about 165° F. What change takes place?

2. Mix egg white and water and add dilute nitric acid. What change takes place?

3. Scrape or squeeze the juice from a piece of round steak and add cold water, or soak a piece of round steak in cold water for ten minutes. Heat the juice. What change takes place?

4. Add a small piece of junket tablet to milk. Heat to about 100° F. Let it stand in a warm place. What change takes place?

Egg white, soluble albumin in meat, and casein in milk are forms of protein, and all proteins are coagulated by heat, acid or ferment.

NOTE TO TEACHER. — The teacher may give or show the Xanthroproteic Test or the Biuret Test for protein.

PRINCIPLES WHICH APPLY TO THE COOKING OF PROTEINS — LESS TENDER CUTS

If certain muscles of an animal are exercised much, the connective tissue which holds the muscle fibers together becomes strong and tough and a cut of meat from one of those muscles would be tougher than one from a set of muscles not exercised so much. Such cuts, as porterhouse and sirloin, are taken from the back of the animal and they are more tender than the round cuts taken from the leg, or chuck cuts from the neck.

As dry heat tends to harden connective tissue, broiling is not so good a method for cooking round or chuck steaks as simmering. Simmering, or applying moist heat, softens the connective tissue and makes the meat tender.

Recipe for Simmered Round Steak. — Have the frying pan smoking hot. Remove a piece of fat from the steak and rub the pan with it, let the fat remain in the pan. Place the steak in the pan as for broiled steak, and cook until both sides are seared. Remove the steak from the pan, season the steak with salt and pepper, and sprinkle generously with flour. Pound the steak with a potato masher, or the blunt side of the butcher knife, as the butcher sometimes does, to cut across the muscle fiber and send the flour into the meat. Return the steak to the hot frying pan; pour enough boiling water over to cover the steak.

Place a cover on the frying pan and cook 30 minutes. Make a gravy from the liquid in the pan and pour over the steak.

Calculate cost. Is simmered steak as expensive as broiled? Why?

STATEMENT OF PRINCIPLES INVOLVED.

1. Heat develops flavor.
2. Heat hardens or coagulates protein so that it will form a crust, and this crust aids in retaining juices and flavor.
3. Heat and moisture soften and dissolve connective tissue.

SUMMARY OF PRINCIPLES OF COOKING

Heat does not have the same effect on all foods. It hardens and toughens protein, it softens carbohydrates and fat, it makes proteins somewhat harder to digest, it frees starch from the outer covering of cellulose and gets it ready for digestion. Most proteins lose water even when cooked in water. Carbohydrates absorb water. The main principles of cooking may be summarized as follows:

1. Heat and moisture soften cell walls, whether it be cellulose in vegetable foods or connective tissue in animal foods.
2. Dry heat hardens connective tissue.
3. Heat and moisture cause starch grains to swell and burst the walls of cellulose which inclose them.
4. Dry heat 320° F. changes starch to dextrin.
5. Dry heat 420° F. caramelizes sugar.
6. Heat frees fat from cell walls which inclose the globules, and strong heat separates and decomposes fat into two substances, fatty acid and glycerine.

7. Heat hardens or coagulates any form of protein and makes it harder to digest.
8. When protein hardens, it forms a crust which aids in retaining juices and flavor.
9. Mineral matter, extractives, and volatile oils are soluble in water.
10. Acids soften cellulose.
11. Acids invert sugar.
12. Heat kills bacteria and other parasites found in foods.
13. Heat makes foods more attractive and palatable, and while it may lessen their ease of digestion, it may by improving their flavor cause an increased flow of digestive fluids and in that way balance the difficulty.

SALMON FOR CANNING.
(From Carpenter's *How the World is Fed.*)

CHAPTER IV

FRUITS AND GREEN VEGETABLES

Uses of Foods. — Proteins build tissue and yield heat and energy. Starch and sugar when oxidized yield heat and energy. Cellulose furnishes bulk, which, by stimulating the walls of the stomach and intestines, promotes the flow of the digestive juices and aids peristalsis. Fats when oxidized yield heat and energy. Mineral salts and acids aid in tissue building, promote osmotic pressure, regulate the acidity or alkalinity of the digestive juices, and because they are decomposed in the body and form alkaline carbonates they help to keep the blood alkaline and control the acidity of the excretions. Water aids in tissue building, forms the great part of the blood, digestive fluids, and excretions. It regulates the temperature of the body and aids in the elimination of waste. Extractives stimulate the appetite and aid in digestion.

Classification of Foods. — Foods are classified for the purpose of study into animal and vegetable foods. In general it may be said that vegetable foods are mainly carbohydrate and animal foods mainly protein. Vegetable foods are classed as: —

1. Fruits
2. Green Vegetables
3. Roots and Tubers
4. Cereals
5. Legumes
6. Nuts

All vegetables have two things in common. They all contain valuable mineral salts which help to keep the blood

alkaline; they contain carbohydrate in the form of starch, sugar, and cellulose, and thus furnish bulk to food.

Roots and tubers are pure, starchy foods containing little or no available protein.

Cereals contain starch and protein in proportion of about 7 : 1.

Legumes contain starch and protein in proportion of about $2\frac{1}{2}$: 1.

Green vegetables are valuable mostly for their mineral salts and cellulose; fruits, for their acids and sugar. Nuts are similar to the legumes in composition. They are not consumed to any great extent as a food, but are merely used as a relish or confection.

FRUITS

Typical Food: Apple. — All fresh fruits are similar in composition and structure and have practically the same food value. They contain 75–80 per cent water, .5–1 per cent protein, 8–20 per cent carbohydrate, 1–3 per cent cellulose, .5 per cent mineral matter, and practically no fat. They are eaten for their mineral salts, which help to preserve the alkalinity of the blood, for their refreshing juices and flavor, and because the cellulose furnishes bulk for the intestines and thus stimulates peristalsis. Some fruits contain enough sugar so that they may be considered valuable carbohydrate foods. In structure fruits consist of walls of cellulose inclosing water, sugar, mineral salts, and acids, with very little protein and fat.

Cooking of Fruits. — Most fruits are eaten raw when they can be procured fresh. Fruits are also dried, canned, preserved, and cooked in various ways. Cooking softens the cellulose, and during the process the action of the acid

in the fruit on the cellulose hastens the softening. If fruits are cooked in water, some mineral salts, acids, and sugar are dissolved in the water. If the water is served with the fruit, there is no loss of nutrients.

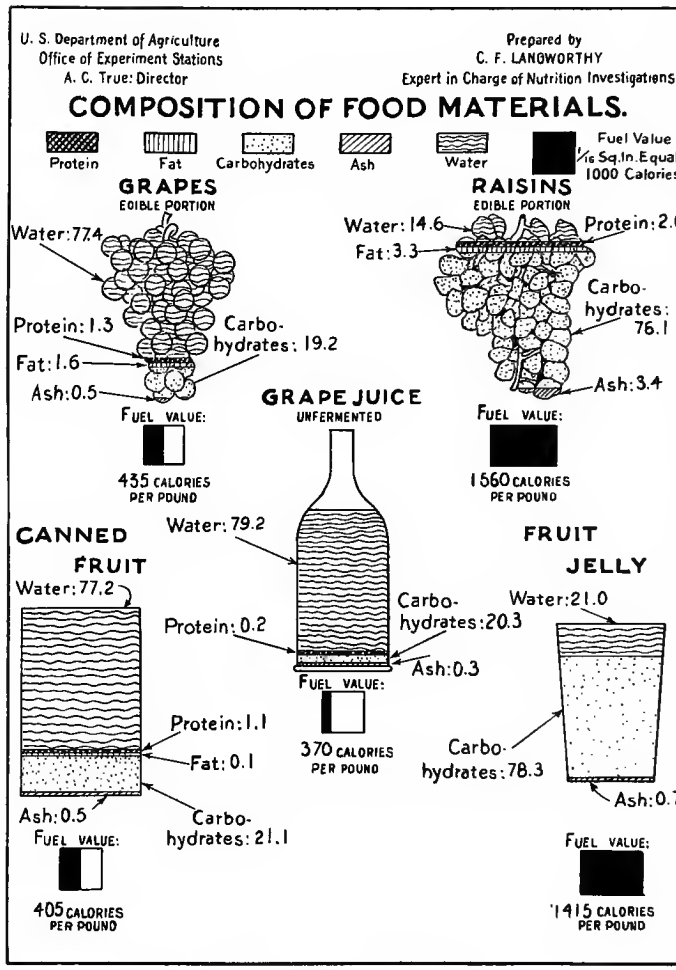
Fruits are dried so that they may be preserved for use. Bacteria and molds which cause the decay of fruits need moisture for development and growth. If the moisture in fruits is evaporated, the fruits will keep indefinitely. When dried fruits are to be used, they must be washed thoroughly and soaked for several hours, or overnight, in water so as to restore as much water as possible. They should be cooked until soft in the same water in which they are soaked. Sugar is added about five minutes before they are removed from the fire.

Fresh fruits may be cooked in a variety of ways. The commonest ways are: baking, steaming, and stewing.

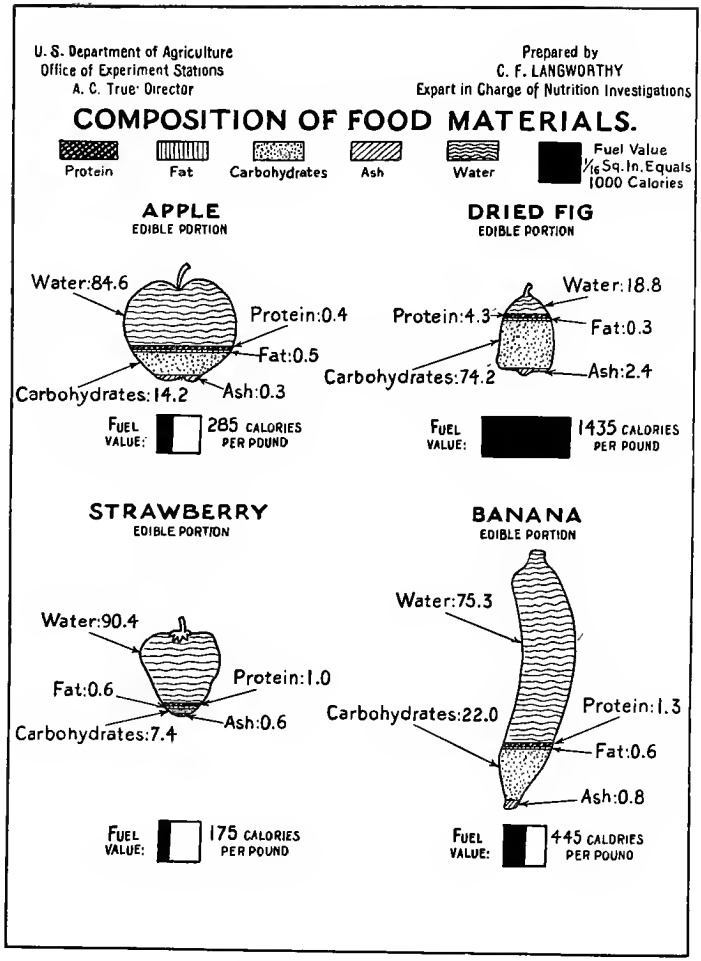
Baked Pears. — Wash and core Seckel pears. Put in a baking dish. Fill the center of the pear with sugar and add enough water in the dish to prevent burning. Cover and cook slowly until the pears are soft. Remove from the baking dish and pour the liquid from the pan over the pears. Other varieties of pears are good for baking, but the Seckel are the most delicious.

NOTE. — In this recipe, and in all recipes which follow, if it is possible, find the cost of the prepared food. Learn at what meal it could be served, and in a general way its nutritive value. Later learn to calculate the nutritive value of each food.

Steamed Apples. — Wash, pare, and core sound, tart apples. Place on a plate in a steamer over a kettle of boiling water and let steam until tender. Remove from the steamer carefully so as not to break the apples, and serve with cream and sugar, or with sirup.



COMPOSITION OF FRUITS.



COMPOSITION OF FRUITS.

Sirup. — Boil one cup of sugar and one third cup of water 3 minutes. Pour over fruit.

Cranberry Jelly or Sauce. — Wash one quart of cranberries, add one cup of cold water, and cook slowly until tender. Press through a strainer until nothing remains but the skins. Add two cups of sugar to the pulp and boil five minutes. Turn into molds and let it stand until it is firm. Serve with poultry or game.

Stewed Prunes. — Wash the prunes thoroughly. Soak overnight in cold water. Cook in the water in which they have been soaked, until soft. Add sugar and cook five minutes longer. The quantity of sugar added depends on individual taste, but one fourth cup of sugar to one pound of prunes is a good proportion.

GREEN VEGETABLES

Green vegetables are the leaves and stems of plants, and as the leaves are the means by which the plant takes carbon dioxide and gives off oxygen, they contain very little nourishment except mineral salts; their bulk is due to the cellulose and water.

The green vegetables with which we are the most familiar are: celery, spinach, asparagus, cress, endive, lettuce, cabbage. Because they are similar in composition, squash, cucumbers, and tomatoes are usually classed with green vegetables, though they are fruits.

Green vegetables contain 90–95 per cent water, 1–2 per cent protein, 2.5–5 per cent carbohydrate, 1–2 per cent mineral matter, and a trace of fat. They are valuable foods because the cellulose furnishes bulk to promote peristalsis and because the mineral salts contain a predominance of the base-forming elements. Spinach, dande-

lions, cabbage, lettuce, and asparagus contain quite a little iron.

With a few exceptions green vegetables should be eaten raw, because the mineral salts, being soluble, are lost in the water in which they are cooked, and because the cellulose serves its purpose best in the crisp form. Spinach and asparagus must be cooked. When vegetables are eaten fresh and served with salad dressing, they form an agreeable and important addition to a meal.

Green Vegetables — Cooked

Spinach. — Wash one half peck of spinach four or five times in plenty of water to remove all the sand found on

Spinach with Rice Border.

the plants. Place the spinach in a kettle and pour a small quantity of boiling water over it. Spinach shrinks rapidly

and needs but little water on it, and as it contains valuable mineral salts, among them considerable iron, that are soluble in water, it is best to use as little water as possible. When cooked, season the spinach with butter, salt, and pepper, and garnish with sliced hard-boiled eggs.

Asparagus. — Wash one bunch of asparagus, cut into inch pieces, and discard the tough lower ends. Place in a stewpan, cover with boiling water, and cook 30 to 45 minutes, or until soft. Thicken the juice as for White Sauce, using two tablespoons of butter, two tablespoons of flour, one fourth teaspoon salt and speck of pepper. Serve on toast or as a creamed vegetable. Asparagus is also served in its own liquid, merely seasoned with butter, salt, and pepper. Asparagus contains considerable iron also, and should not be drained.

Creamed Celery. — Separate the stalks of celery, and save the tender inner parts to serve as a relish. Wash the stalks and remove the rusty portions. Cut into inch pieces, cover with boiling water, and cook until tender. Drain, pour White Sauce over, and serve.

Creamed Cauliflower. — Soak cauliflower for one half hour in cold salted water. Cut the clusters apart, cover with boiling water, and cook until tender, about 35 minutes. Drain, pour White Sauce over, and serve.

Spanish Tomatoes. — Peel three large tomatoes and cut into slices. Place in a stewpan, add one half cup of cold water. Remove the corn from two ears of green corn and add to the tomatoes. Add one half small green pepper chopped fine, one fourth cup of celery cut into small pieces. Boil 20 minutes, add three tablespoons of butter, one half teaspoon salt, and one eighth teaspoon pepper.

Green Vegetables — Salads

Salads are made of cold meat or fish, eggs, cheese, raw or cooked vegetables or fruits, combined with a salad dressing. The green vegetables, often called the salad plants, are cress, endive, lettuce, cabbage, cucumber, celery, and tomato; and they make the most attractive salads. They are cooling, refreshing, stimulate the appetite and should be eaten as frequently as possible because of the mineral salts which they contain. They may often take the place of a dessert at a meal.

To make a perfect salad the vegetables should be crisp and cold. All ingredients in the dressing should be properly proportioned and well blended, and the salad should be attractively served. Vegetables should be washed and allowed to stand in ice-cold water or on ice, until crisp. They should then be drained and placed in a cheesecloth bag in a cool place until they are served. Dressing is added at the table or just before sending to the table.

If meat or fish is used, free it from bone and fat, and cut it in small uniform pieces. Canned fruit or cold left-over vegetables may be used for salads. For dinner serve a green vegetable or fruit salad. For luncheon serve a fish, cheese, or heavy salad, and let it serve as the principal dish. Fish, cheese, or meat salad contain all the protein needed for a meal. At dinner, when meat is served, the salad should not furnish additional protein, but mineral salts, cellulose, and relish.

SALAD DRESSINGS

Cooked Salad Dressing. — Mix one tablespoon of flour, one teaspoon salt, one teaspoon mustard, one tablespoon sugar,

and a speck of cayenne pepper. Add two tablespoons of melted butter, two egg yolks, and three fourths cup of milk. Cook in a double boiler until it thickens, stirring constantly. Then add three tablespoons of vinegar and boil one minute.

French Dressing. — Mix one half teaspoon salt, a speck of cayenne pepper, four tablespoons olive oil, and beat thoroughly. Add one tablespoon vinegar and beat vigorously until thoroughly blended.

Mayonnaise Dressing. — Beat the yolk of one egg; add one fourth teaspoon each of salt and paprika and beat again, then use an egg beater and beat in two tablespoons of vinegar or lemon juice; beat vigorously, then add a teaspoon of olive oil and continue beating; add oil, a teaspoon at a time, three or four times, beating vigorously meanwhile; then add the oil by the tablespoon until a cup in all has been used. Finish with one tablespoon of boiling water, beating it in, in the same manner as the oil. (*Boston Cooking School Magazine.*)

Garnish for Salad.

Lettuce	Capers
Endive	Hard-boiled Eggs
Water Cress	Riced Eggs
Peppers	Diced Vegetables
Parsley	Nasturtium Leaves and Flowers

To Serve with Salad.

Cheese Straws	Crackers
Cheese Wafers	Brown, Graham and
Sandwiches	White Bread, sliced very
Wafers	thin, buttered.

Stuffed Tomato Salad. — Remove skin from tomatoes by pouring boiling water over them. Cut a slice from the

top of the tomato and remove the interior. Fill the tomato with cucumber cut in very thin slices and place Cooked Salad Dressing over the top. Serve on lettuce.

Grape Salad. — Remove the skins and seeds from white or red grapes and cut in halves. Take equal parts of grapes, sliced peaches, pears, pineapple, or any fruit obtainable. Place on leaves of endive or head lettuce and serve with Mayonnaise Dressing.

GRAPE SALAD.

Cabbage Salad. — Cut one half of a small head of cabbage in very thin slices, or chop it with the chopping knife. Mix with one recipe of *hot* Cooked Salad Dressing. Chill and serve cold.

Waldorf Salad. — Chop equal quantities of apple, celery, and walnuts. Mix with Cooked Salad Dressing. Serve on lettuce leaves.

Banana Salad. — Take ripe bananas, cut them in halves lengthwise. Roll in Cooked Salad Dressing. Chop one half cup of peanuts. Roll the bananas in the nuts. Serve on lettuce leaves.

Fruit Salad. — Arrange layers of sliced pineapple, peaches, or pears on lettuce. Serve with Mayonnaise Dressing.

Cucumber or Tomato Salad. — Remove skin, slice tomatoes in thick slices; slice the cucumbers in thin slices. Serve on lettuce leaves with French or Cooked Salad Dressing.

Potato Salad. — Cut two cups of cold boiled potates in one half inch cubes. Add one half teaspoon salt, and one tablespoon of chopped onion. Mix with one recipe of Cooked Salad Dressing or Sour Dressing, and garnish with sliced hard-boiled eggs and chopped parsley.

Asparagus Salad. — If fresh asparagus is not obtainable at a reasonable cost, remove the liquid from a can of blanched asparagus tips, and rinse well. Chop one pimento. Arrange six or eight stalks of asparagus on head lettuce leaves. Sprinkle with chopped pimento and serve with French Dressing.

Asparagus Salad.

Combination Salad. — Chop, separately, one half cup each of cucumber, tomato, and celery; add one teaspoon of chopped onion. Mix lightly with a fork until blended; add Cooked Salad Dressing and serve on lettuce leaves.

PRESERVATION OF FOODS

So much is said and written concerning harmful bacteria or germs, that we are inclined to think that all kinds of bacteria are powerful and insidious enemies.

No warning yet issued seems to be strong enough to influence all thinking and reasoning people to take means to destroy the harmful, disease-breeding, or pathogenic bacteria. To this class belong the germs causing typhoid fever, tuberculosis, diphtheria, scarlet fever, and other contagious diseases. If all people would be vigilant for a few years, we could destroy practically all these germs and free the world from the preventable sicknesses due either to carelessness or ignorance.

The study of pathogenic bacteria belongs to the subjects of sanitation and hygiene in regular school work, and it bears but indirectly on cooking. It relates to cooking in so far that absolute cleanliness must be the motto for both kitchen and cook, and that precaution must be taken that water, milk, and other foods, do not contain disease-forming bacteria. Because public health boards do not attend to these problems the housekeeper must.

Dust and dirt are unsightly, and we must be constantly on guard to keep them out of our homes, but that is not all. Dust and dirt furnish excellent breeding places for disease germs, and for that reason, if for no other, we must keep things clean and prevent accumulation of dirt.

Cooking deals directly with a much more interesting class of bacteria, as it deals with molds and yeast. All bacteria are not pernicious and harmful; some are harmless and some are useful. Some of these bacteria feed on food, leaves, wood, and other substances, and break them

down so that the elements of which these substances are composed may again furnish food for new plants. In other words, bacteria cause the decay of organic substances and return to the soil what plants take from it, and by their work they make it possible to raise crops every year.

Nature protects the little apple, tomato, cherry, and other seeds, by covering them with a soft pulp. When the seeds are ripe, the pulp begins to decay; protection is no longer needed; the seeds are able to take care of themselves.

Man has found a use for these soft, juicy, and deliciously flavored seed coverings, and he desires to save them for his food. To do this some means must be found to stop the growth of those bacteria which cause decay.

Bacteria need food, warmth, and moisture for development and growth. Most kinds are destroyed at a temperature above 160° F., though what are called the spore-forming kinds can resist higher temperatures; even boiling temperature does not always kill them. Freezing temperature does not destroy bacteria, but they do not develop at a temperature just above freezing. When brought from a freezing temperature to a higher temperature, they develop with astonishing rapidity.

To preserve foods for use, it is necessary to destroy the bacteria present or to prevent their growth. Several different methods are used for preservation. Drying takes out the moisture needed for development of bacteria and preserves foods for indefinite periods of time. Cold storage deprives the bacteria of the heat needed for their development and retards their growth. Some media, as sugar, vinegar, spices, salt, smoke, make it impossible for bacteria to grow. We say that they cannot thrive well in certain media. Certain chemical preservatives, having no

food value in themselves, destroy bacteria, but they should not be used in foods because they are harmful to the body.

Bacteria are present in the air and they may enter foods after the foods have been rendered sterile by boiling. For this reason foods are canned, or sealed in air-tight, sterilized jars after the food has first been made sterile. If a sufficient quantity of sugar, salt, or vinegar has been used, sealing is not necessary, because bacteria cannot grow in the solution used; but in canning, a small quantity of sugar is used, and that solution is very favorable for the growth of certain bacteria.

CANNING

With a little care, all fruits and many vegetables can be canned and stored for winter use. Many vegetables thus prepared taste almost as good as when fresh, and they relieve the monotony of a diet that must otherwise be limited to winter-kept vegetables. All fruits — apples, cherries, plums, even melons — may be canned with little expense. By canning is meant preserving in sterilized, air-tight cans or jars, with or without sugar.

For small families, the pint jars are best, because that quantity will serve for one meal, and if a larger jar is opened, the fruit deteriorates before it can be used. In fact pint jars are best in all cases where fruit is canned. In pickling, a larger jar is necessary, because the fruit is whole. New rubbers should be procured for the jars every season; and if the covers are bent or old, new ones can be purchased at a slight cost. If old rubbers or bent covers are used, the jar will not be air-tight and the fruit and labor are lost. If air-tight, and the work is properly done, not one can of fruit should be lost.

To sterilize the jars, provide a wooden rack or blocks, so that the jars will not come in contact with the bottom of the pan or kettle used. Place the jars, filled with cold water, on the block in the pan or kettle and then fill the kettle with cold water. Place on the stove where they will heat gradually, and when the water boils, the jars are sterilized and ready for use. Dip the rubbers in hot water before placing on the cans, and sterilize the covers also.

Fill the jars to overflowing with fruit, and sirup or boiling water. Insert the handle of a silver fork or spoon between the jar and fruit so that the air bubbles will rise to the top. Put on rubbers and covers and screw them tight. After the jars have been cooled, tighten the covers again, invert the jars, and let them stand in this way, to be sure that no juice comes out; if it does, the jars are not air-tight.

NOTE. — New styles in fruit jars are constantly appearing on the market. Complete directions, for the successful use of these jars, are always given by the retail merchant.

Canned Tomatoes. — Place tomatoes in boiling water to remove the skins. Tomatoes may be canned whole or cut into halves. Fill the cans with tomatoes, and place the covers on loosely. Place the jars in a boiler or deep pan. The jars should rest on a wooden rack or light blocks to keep the jars from contact with the bottom of the pan. Fill the pan with cold water up to two inches from the top of the jars. Heat to the boiling point and boil twenty minutes. Fill the jars to overflowing with boiling water, put on rubbers, cover and seal.

Canned Corn. — To nine pints of corn add one pint of sugar and two thirds of a pint of salt and enough water to

cover the corn. Cook fifteen minutes after it begins to boil. Fill sterilized jars, to overflowing, with corn, and seal. When ready to use, pour boiling water over the corn to freshen it, and strain.

Canned Peaches and Other Fruits. — Peaches, pears, cherries, apples, may all be canned in the same way. Fruits, like pineapple and quince, should first be cooked in boiling water until nearly soft, and then canned as for peaches.

Allow four cups of water to four cups of sugar for sirup. Boil the water and sugar ten minutes and then drop in the fruit, a small quantity at a time, so as not to crush it. Cook until nearly soft and then fill the jars. The hot sirup will finish the cooking of the fruit.

To prepare peaches, place them in boiling water to loosen the skins, and then peel. Peaches may be canned whole or in halves or quarters.

STRAWBERRIES.

Canned Berries. — Berries contain so much water that very little should be added. Fill the jars full of whole berries. Make a sirup by crushing some of the berries, heating them slightly, and straining the juice. Allow one and one half cups of sugar to each cup of juice and boil three minutes. Fill the jars with sirup and proceed as for canned tomatoes.

Jelly Making. — The best fruits for jelly making are currants, apples, grapes, and quinces. Wild green crab apples or wild grapes make deliciously flavored jelly.

These fruits are best because they contain considerable pectin or pectose. Pectin is a carbohydrate found in ripe or nearly ripe pulpy fruits and causes the juice to gelatinize. Some fruits contain so little pectin that they will not make jelly unless some fruit rich in pectin is added. For example, red raspberries contain little pectin, while currants are rich in it. Red raspberries with currants added make a very fine jelly.

Test Juice for Pectin. — Mix equal amounts of ethyl alcohol and boiled fruit juice, and if pectin is present a gelatinous mass will appear on the spoon inserted.

Pectin is most abundant in the skin and core of the fruit, and it loses its gelatinizing power when the juice is boiled too long. The pectin is at its best when the fruit is just ripe or not quite ripe, but if the fruit is overripe, the chances are that the jelly will not stiffen. When the boiling has been too violent, jelly becomes crystallized after it stiffens. If the juice is stirred when boiling, the jelly will become coarse and tough.

Currant Jelly. — Wash and drain the currants without removing the stems. Put them in a granite kettle, half cover with water, mash them slightly, and allow them to cook slowly. Strain through a coarse strainer, being sure that all the fruit is crushed, then allow the juice to drain through a double thickness of cheesecloth. Do not squeeze the bag or the jelly will not be clear. Measure the juice and boil five minutes. Add an equal quantity of heated granulated sugar and boil five minutes. Boil slowly and skim until clear. Then pour into sterilized glasses. Place in a sunny window and let it stand until it stiffens. Cover with paraffin paper. The length of

time for boiling before adding sugar depends on the amount of water added to the fruit.

Apple Jelly. — Wash and wipe the apples and remove the stems and blossom end. Cut the apples in quarters, place in a granite kettle and add enough cold water to nearly cover them. Cook slowly until the apples are soft, then crush and drain through a sieve and strain the juice through a double thickness of cheesecloth. Measure the juice and boil it fifteen minutes. Add an equal quantity of heated granulated sugar and boil slowly five minutes. Skim and pour into sterilized glasses.

Grape Jelly. — Wash the grapes and remove them from the stems. Place in a granite kettle. Nearly cover with water, crush slightly, and boil until soft. Strain through a double thickness of cheesecloth. Measure the juice and boil ten minutes. Add an equal quantity of heated granulated sugar and boil three minutes. Skim and pour into sterilized glasses.

Pickled Peaches and Other Fruits. — Six cups sugar, three cups vinegar, one ounce stick cinnamon, one dozen whole pepper seeds. Boil twenty minutes. Remove skins from peaches, place two whole cloves in each peach. Cook in the sirup until nearly soft. Fill jars and seal. Crab apples are very nice pickled this way.

Pickled Nasturtium Seeds. — Pick green seeds and soak twenty-four hours in salted water. Drain, wash, and let stand two hours in fresh water. Pack in bottles and fill with boiling vinegar. They may be used in place of capers for caper sauce.

Tomato Catsup. — One gallon strained tomatoes, four level tablespoons salt, three tablespoons black pepper, three tablespoons mustard, one tablespoon paprika,

two tablespoons chopped red pepper, one half tablespoon cloves, one half tablespoon allspice, two tablespoons sugar, one pint vinegar. Place black pepper, cloves, and allspice in small bags to prevent discoloring the catsup. Boil until the required thickness; place in bottles and hermetically seal.

Chili Sauce. — Two quarts of peeled and sliced ripe tomatoes, one cup of chopped celery, one chopped red pepper, one chopped onion, three tablespoons sugar, one tablespoon salt, one tablespoon cloves, one tablespoon allspice, one tablespoon cinnamon, one half tablespoon paprika, one pint vinegar. Cook slowly about two and a half hours.

Pear Conserve. — Peel and cut into cubes, five pounds of pears, add five pounds of sugar. Let stand over night. Drain off the sirup and boil it until thick, then add the pears, one pound of seeded raisins, one half pound of walnuts cut fine, the juice and rind of two lemons, juice and rind of three oranges, and boil the mixture five minutes. Put into glasses and cover with paraffin.

Pickled Beans. — Boil round yellow beans in salted water until tender but not soft. Drain and fill cans with beans, pour hot sirup over, and seal. Sirup: one quart of vinegar, two cups of sugar, whole cloves and cinnamon to taste. Boil for five minutes.

Pickled Cucumbers. — Select medium-sized cucumbers and soak over night in a brine which will float an egg. Wash and drain pickles and place in cans, add one tablespoon each of sugar, salt, and mustard to a quart of pickles. Fill the cans with cold vinegar and seal.

CHAPTER V

ROOTS AND TUBERS: THEIR CHIEF FOOD PRODUCTS

ROOTS AND TUBERS

Roots, tubers, and bulbs are either the roots or thickened stems of vegetables in which sugar or starch is stored for the nourishment of the young plant when it shall need it. Because they are storehouses of nourishment, they have a higher food value than most fruits or green vegetables, although some few fruits equal them in nutritive value.

They contain from 70–90 per cent water, 8–26 per cent carbohydrate in the form of starch, sugar, pectin, and cellulose, 1 per cent mineral matter, less than 2 per cent protein, and only a trace of fat. When we purchase them at the market they contain about 20 per cent refuse. That is, about 20 per cent is trimmed off when we prepare them for cooking.

Roots and tubers are cheap foods and supply almost endless variety to the diet, since they are easily prepared in many appetizing ways. They furnish 16 per cent of the average American diet, potatoes alone furnishing $12\frac{1}{2}$ per cent. Their food value is in the carbohydrates and mineral salts which they contain.

Roots and tubers are usually grouped into two classes, — starchy roots and tubers, which include potatoes, sweet potatoes, yams, and the starchy foods prepared from roots and stems, as tapioca, sago, and arrowroot; and succu-

lent roots and tubers, which include beets, turnips, carrots, rutabagas, parsnips, salsify, celeriac, radishes, onions, kohlrabi, and garlic. The flavor and odor of these foods are due to the presence of volatile oil which may be retained or dissipated by proper cooking.

Typical Root or Tuber, Potato.

COMPOSITION. — 78.3 per cent water; 18.4 per cent carbohydrate, of which 16 per cent is starch, 2 per cent dextrin, sugar, pectose, .4 per cent cellulose; 2.2 per cent nitrogenous matter, of which 1.3 per cent is protein; 1 per cent mineral matter.

STRUCTURE. — The potato consists of a network of cells held together by cellulose and surrounded by a brown corky skin. The cells contain starch, mineral matter, and a very small amount of protein.

Experiments with Potato to show Content.

Water. — Let the potato stand in a warm, dry place and weigh it occasionally. Note the loss of water by evaporation.

Starch. — Grate the potato, place in a cheesecloth bag, and wash the starch out. Let the water stand until the starch settles, then pour the water off and weigh the starch. Starch test: A solution of iodine turns starch blue.

Ash. — Burn potato in a crucible until nothing remains but the ash.

FOOD VALUE. — Potatoes are the most important carbohydrate food, and it may be said that they are served at every dinner and usually at one other meal in the average American home. They generally furnish the main carbohydrate part of a dinner and are valuable also for the potash and other important mineral salts which they contain.

PRINCIPLES INVOLVED IN COOKING. — Potatoes are made up of innumerable cells, having walls of cellulose and inclosing starch, mineral matter, water, and a small amount of protein. Heat causes the starch grains to swell and burst the cell walls, and thus the starch is free so that the digestive juices can act on it. Heat coagulates the protein. Some starch and mineral matter are lost when potatoes are pared and cooked in boiling water. There is no loss when they are steamed or baked.

METHOD OF PREPARATION. — Potatoes should be pared thin, as much of the protein and mineral salts are directly under the skin and are lost in deep paring. When potatoes are being prepared, they should be covered with water and should remain in water until it is time to cook them. If they are exposed to the air, they turn black, because certain ferments in them become active in the presence of oxygen. Old potatoes may be soaked in water to restore some of the lost moisture, but ordinarily nutrients are lost if potatoes are left soaking in water for any length of time. Potatoes should always be cooked in boiling water, not simmering or nearly boiling, so as to coagulate the protein and retain all the nutrients possible.

METHODS OF COOKING. — Baking, boiling, scalloping, frying, etc.

Grated potatoes are used for puddings, pies, muffins, soups, cakes, etc.

Baked Potatoes. — (See recipe, page 35.)

Boiled Potatoes. — Wash and pare potatoes, cover with cold water until time to cook. Put into boiling salted water and cook until soft, about 30 minutes, allowing one tablespoon of salt to each quart of water. When done,

drain thoroughly, cover with a folded napkin, and set where they will dry off and keep warm until served.

Potatoes boiled " in jackets " are more nutritious than those pared before boiling, as there is practically no loss of nutrients when they are simply washed clean and plunged into boiling water, and cooked. Because of ease in serving, potatoes are usually pared.

Mashed Potatoes. — Mash hot boiled potatoes and to every pint of potato add one tablespoon of butter, one half teaspoon of salt, and enough milk to moisten. Beat thoroughly.

Escalloped Potatoes. — Slice the potatoes in slices one fourth inch thick. Parboil 10 minutes. Place the potatoes in a baking dish in layers. Pour thin White Sauce over them, and sprinkle with buttered crumbs. Bake 20 to 30 minutes in a slow oven.

Thin White Sauce. — Two tablespoons butter, one tablespoon flour, one cup milk, one fourth teaspoon salt, speck of pepper. Prepare as for White Sauce.

Glazed Sweet Potatoes. — Wash and pare the potatoes. Cut into halves lengthwise. Parboil 10 minutes. Dip into sirup, put into a buttered pan, bake 15 to 20 minutes. Baste occasionally with the sirup. Bake in a hot oven.

Sirup. — Mix one half cup sugar, four tablespoons water, one tablespoon butter. Boil three minutes.

Potatoes in White Sauce. — Cut cold boiled potatoes into half inch cubes. Make a White Sauce. Add potatoes and heat.

Stuffed Potatoes. — Bake large potatoes, cut lengthwise through the center. Remove the inside and mash. For six potatoes use two tablespoons butter, one fourth cup milk, one eighth teaspoon pepper, one fourth teaspoon

salt, one fourth cup chopped egg, or parsley, or two tablespoons grated cheese. Return to shell, and brown in oven.

Lyonnaise Potatoes. — Cut three medium-sized potatoes in cubes. Melt three tablespoons butter in hot pan, add one tablespoon chopped onion, cook in butter until brown.

POTATO SALAD.
Garnished with sliced beet, sardines, and boiled eggs.

Add the potatoes, sprinkle with one fourth teaspoon salt, speck of pepper, and stir occasionally until golden brown.

Cream of Potato Soup. — Cook three potatoes in boiling salted water; when soft, rub through a sieve, and use about two and a half cups of potato. Scald one quart of milk with two slices of onion. Add the potato. Remove onion. Melt two tablespoons butter, add two tablespoons flour, and mix thoroughly. Add one teaspoon salt, one eighth teaspoon pepper. Stir into the soup. Boil three

minutes, sprinkle with one tablespoon chopped parsley, and serve.

Cream soups are White Sauce with some vegetable added for flavor and to increase the nutritive value.

Croutons. — Cut slices of bread one half inch thick, and spread with butter. Cut into inch squares, and place in the oven and brown. Serve with soup.

Potato Salad. — Cut two cups of cold boiled potatoes in one half inch cubes. Add one half teaspoon salt, and one tablespoon of chopped onion. Mix with one recipe of Cooked Salad Dressing or Sour Dressing, and garnish with sliced hard-boiled eggs and chopped parsley. A very attractive dish is made when this salad is garnished with sliced beets, sardines, and boiled eggs. See illustration on page 77.

Sour Dressing. — Mix one fourth cup of melted butter, one half cup of hot vinegar, one half teaspoon salt, one eighth teaspoon pepper, one half teaspoon chopped onion.

SUCCULENT ROOTS AND TUBERS

Succulent roots and tubers contain more water and less nutrients than the starchy roots and tubers, and so have a lower food value. They are valuable additions to the diet because of their mineral salts, large amount of cellulose, flavor, and because they furnish variety. They all contain carbohydrate in some form.

SELECTION. — Old roots and tubers are tough and woody and require a much longer time for cooking than the young and tender ones. They have a lower food value because they contain so much cellulose, are of a coarser texture and often are dry and corky.

PREPARATION. — Succulent roots and tubers should be washed clean, pared as thin as possible, cooked whole when

possible, and sliced if so desired, after they are cooked. If cooked in a small quantity of water, there is less loss of nutrients than when a large quantity of water is used. When they are steamed, there is practically no loss of nutrients.

Methods of Preparing Succulent Roots and Tubers and Green Vegetables for the Table.

1. CREAMED. — Boiled and sliced, served with White Sauce.
2. DICED. — Boiled and cut into small pieces or cubes.
3. GRATED. — Grated and served with Salad Dressing as a salad.
4. MASHED. — Boiled and mashed and flavored with butter, salt and pepper.
5. FRIED. — Boiled and cut into thin slices, and dipped in crumbs. or flour, and sautéd. May be sliced first, then boiled. Sauté in bacon fat or half lard and half butter.
6. SCALLOPED. — Sliced, parboiled (partially boiled), and baked with thin White Sauce and buttered crumbs.
7. PICKLED. — Boiled, sliced or whole, with vinegar added before serving. All vegetables are best cooked whole and sliced afterwards, because there is loss of nutritive ingredients when they are cooked in water, and the more surface exposed, the greater the loss.

The greater the amount of cellulose a vegetable contains, the longer the time needed for cooking. Old vegetables require longer time than fresh ones because the cellulose has become woody. For this reason no time can be given in the recipe.

Lessons on Succulent Roots and Tubers.

1. Fried Carrots or Parsnips.	For method see Number 5.
2. Grated Carrots.	For method see Number 3.
3. Mashed Rutabagas.	For method see Number 4.
4. Pickled Beets.	For method see Number 7.

PREPARED STARCHY FOODS

In tropical countries, many foods, unknown to us, form common and staple articles of diet. Some of these foods are prepared for our market and sold to us in the dry form, and they furnish variety to our meals. Chief among the starchy tropical foods which we enjoy eating are tapioca, sago, and arrowroot. Of these tapioca is the least expensive, the best known, and one most commonly used.

The tapioca which we use is prepared from the roots of bitter cassava plant. These roots are washed, cut, ground to a pulp, and the bitter acid which they contain is removed. The pulp is then treated so as to separate the pure starch from the woody fiber or cellulose. The starch is then dried and sold as flake, pearl, or minute tapioca. The flake tapioca occurs in irregular pieces, the pearl in round form, and the minute is ground to a coarse powder so that it will cook quickly. As tapioca is a dried food, it must be soaked to restore the lost moisture before it can be cooked. Flake and pearl tapioca should be soaked at least an hour, preferably two hours. Minute tapioca should be soaked at least ten minutes.

Sago is prepared from the spongy pith or center of the trunk of the sago palm tree. The pith of the tree reaches its fullest development just before the tree begins to bear fruit. At this time the tree is cut and the pith is removed and ground to a powder. The powder is mixed with water to separate the starch from the fiber. After the starch is washed out, it is dried and sold as sago.

Tapioca Pudding. — Soak one fourth cup of flake or pearl tapioca in one half cup of water for at least an hour, add two cups of milk, and cook until the tapioca is trans-

parent, about 30 minutes. Beat two eggs, add one fourth cup of sugar, one eighth teaspoon of salt, one teaspoon of vanilla, and mix thoroughly with the tapioca. Bake in a moderate oven for 30 minutes. Sago may be used instead of tapioca.

Apple Tapioca. — Soak one fourth cup of minute tapioca in one fourth cup of water for ten minutes, add two cups of milk, and cook until the tapioca is transparent, stirring constantly. Add one fourth cup of sugar, one eighth teaspoon of salt, and one cup of thinly sliced or chopped tart apples. Turn into a baking dish and bake until the apples are soft. Serve with cream or soft custard.

SUGAR

Sugar or sucrose is made from the juice of sugar cane, sugar beets, and from the sap of the maple tree. Cane, beet, and maple sugars are exactly alike, chemically, but maple sugar contains certain substances which give it its peculiar flavor. Formerly most of the sugar was made from sugar cane, but now beets are raised extensively for sugar, and much sugar is manufactured from them. While there is no scarcity of sugar for the reason that beet sugar is supplanting cane sugar, there is a scarcity of molasses, sirup, and the by-products of cane sugar. Most of the sirup and molasses sold in the country is made directly from glucose, which is made from corn, and colored and flavored until it looks like the by-products of cane sugar. Corn sirup is a good food product, and has its uses in cooking, but it should be labeled and sold as such so that the purchaser will know exactly what he is getting.

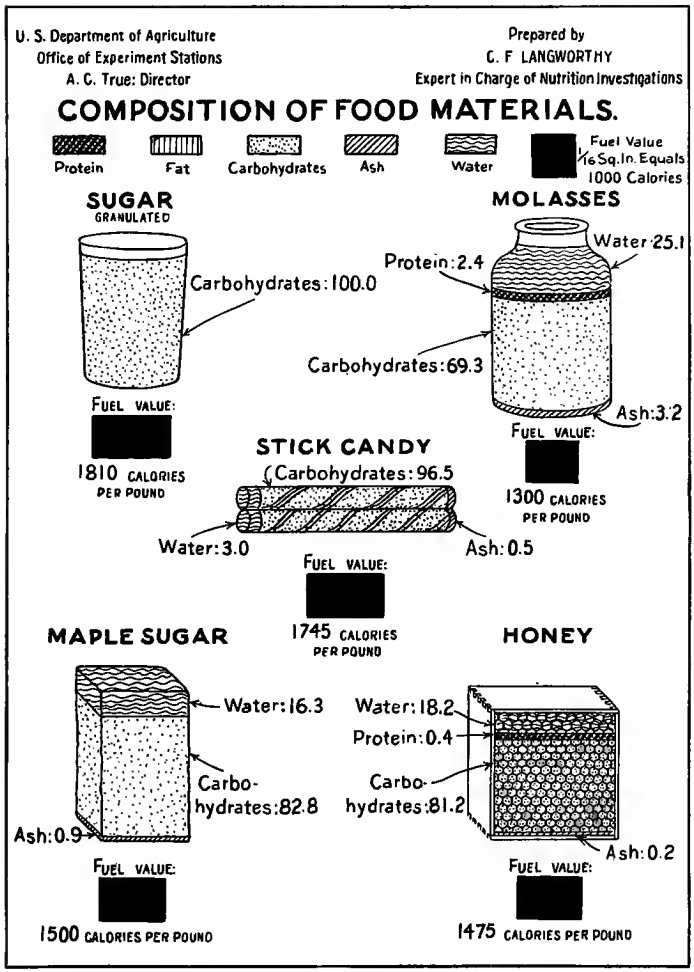
In the making of sugar from the juice of sugar cane the stalks are crushed, and the juice is boiled until it is a thick

sirup. As it boils, part of it crystallizes and is called raw sugar, and part of it, containing all the impurities in the sugar juice, including potash salts, will not crystallize and is called molasses. Improvements are constantly made in the process of sugar making, and it is now possible to crystallize nearly all the juice, and so less and less molasses is left. Molasses is acid in reaction, and because of the impurities which it contains, — impure in the sense that they interfere with the crystallization of the sugar, — it gives to foods a very pleasing flavor and has a high nutritive value.

After the raw sugar is separated from the molasses, it is mixed with water, and milk of lime to neutralize it, bleached, clarified, and put into vacuum pans and boiled to a thick sirup. This sirup is then put into centrifugal machines which separate the sugar from the sirup. The sugar becomes fine white crystals, and, because of improvements in the process, practically all the sirup becomes sugar.

Soft sugars are partially refined sugars. The refined sugars are sold as bar, cube, tablet, crystallized, coarse grain, medium grain, fine grain, and pulverized sugars.

Corn sirup or glucose is a noncrystalline sugar, and for that reason it has distinctive uses in cooking. All sucrose or cane sugar is inverted to glucose during cooking by the addition of acid or when sugar is added to fruits containing acid, as in the making of cranberry jelly. As glucose is only three fifths as sweet as sucrose, if the inversion takes place, more sugar is needed than when it is added after the fruit has finished cooking. If the sirupy consistency is desired, however, the sugar must be boiled with the fruit.


U. S. Department of Agriculture
Office of Experiment Stations
A. C. True: Director
Prepared by
C. F LANGWORTHY
Expert in Charge of Nutrition Investigations
COMPOSITION OF FOOD MATERIALS.
Protein
Fat
Carbohydrates
Ash
Water
Fuel Value 1/16 Sq. In. Equals 1000 Calories
SUGAR
GRANULATED
Carbohydrates: 100.0
FUEL VALUE:
1810 CALORIES PER POUND
MOLASSES
Water: 25.1
Protein: 2.4
Carbohydrates: 69.3
Ash: 3.2
FUEL VALUE:
1300 CALORIES PER POUND
STICK CANDY
Carbohydrates: 96.5
Water: 3.0
Ash: 0.5
FUEL VALUE:
1745 CALORIES PER POUND
MAPLE SUGAR
Water: 16.3
Carbo-hydrates: 82.8
Ash: 0.9
FUEL VALUE:
1500 CALORIES PER POUND
HONEY
Water: 18.2
Protein: 0.4
Carbo-hydrates: 81.2
Ash: 0.2
FUEL VALUE:
1475 CALORIES PER POUND

SUGARS.

During the making of frostings and fondant, an acid, as cream of tartar or vinegar, is added to the sugar to change it to glucose and give it a smooth consistency. If rightly made, frostings and fondant will not crystallize, because acids boiled with cane or beet sugar invert or change it to glucose.

CANDY MAKING

When sugar and some liquid are boiled together as in candy making, different temperatures or different degrees of density are closely noted, as they indicate different stages or changes in the mixture and produce candies of different texture.

Sugar thermometers are sometimes used to learn the temperatures, but expert candy makers can test by dropping some of the solution in cold water, by the sound while boiling, by the appearance of the sirup, or by the finger test.

The tests that are most used in cooking and candy making are, the thread stage, 215° F.; the soft ball, 238° F.; the hard ball, 248° F.; the crack, 290° F.; and the caramel, 350° F. The thread stage is used in making frosting, the soft ball for fondant, the hard ball and crack for molasses candy, and the caramel for peanut brittle.

Peanut Brittle. — Heat two cups of sugar until melted, stirring constantly so that part of the sugar does not burn before the rest is melted. When the sugar is melted, add one cup of peanut meats and turn into a buttered pan. If a porous texture is desired, add one fourth teaspoon of soda as soon as the sugar is melted, and stir quickly. (Care must be taken that the sugar

does not boil up too quickly after the soda is added, for there is danger that the candy maker may receive a severe burn.)

Molasses Candy. — Place in a large granite kettle two cups of molasses, one cup of sugar, two tablespoons of butter, and one tablespoon of vinegar or lemon juice. Boil until it reaches the crack stage, stirring constantly. Pour into a buttered pan until cool enough to handle. Pull until it is as light colored as desired.

Fondant. — Two cups of sugar, one half cup cold water, one eighth teaspoon cream of tartar. Mix the sugar and water together, and put on the stove to boil. Stir until it begins to boil, then add the cream of tartar. Boil *without* stirring until it forms a soft ball when dropped in cold water. Turn on to a large plate or platter, and let it cool until you can indent it with a finger. Then work back and forth with a knife until it becomes white and creamy. Take it up and knead it as you would knead bread, until it is smooth. Roll in oiled paper, and let it stand twenty-four hours. Color and flavor as desired, and shape in creams.

Sea Foam. — Boil together one cup of granulated sugar, one fourth cup of hot water, one fourth cup of corn sirup. Cook to a hard ball. Beat an egg white stiff and dry. Then add one speck of salt. Add the above sirup *very* slowly to the egg, beating it until stiff. Flavor with one fourth teaspoon of vanilla.

Divinity Fudge. — Boil three cups of brown sugar, one third cup of corn sirup, two thirds cup of water, to a hard ball. Beat whites of two eggs dry, pour hot sirup on gradually. Beat constantly until mixture hardens. Add one cup of nutmeats. Shape into balls.

Chocolate Fudge. — Two cups of sugar, two ounces of chocolate, one half cup of milk, one tablespoon of butter. Boil to a soft ball without stirring. Remove from fire. Add one teaspoon vanilla. Beat until thick. Turn into buttered pan to cool.

Chocolate Caramels. — Melt three ounces of chocolate, add two cups of molasses, one cup of brown sugar, two tablespoons of butter, one third cup of milk and mix thoroughly. Boil to a hard ball. Remove from the fire, add one teaspoon of vanilla, turn into a buttered pan, and when cool, mark into squares.

Cream Candy. — Mix two cups of sugar, one half cup of water, three tablespoons of vinegar, and one teaspoon of cream of tartar. Boil until it forms a hard ball, add one teaspoon of extract of lemon, and turn into a buttered pan. When cool, pull until white, and cut into squares.

Candied Popcorn. — Mix one tablespoon of butter, one cup of sugar, and four tablespoons of water. Boil until it threads or forms a soft ball. Pour the hot sirup over freshly popped popcorn, being careful to distribute it evenly. Mix well so that each kernel is coated with sirup and keep stirring until the corn has cooled. Nuts may be coated in the same way.

CHAPTER VI

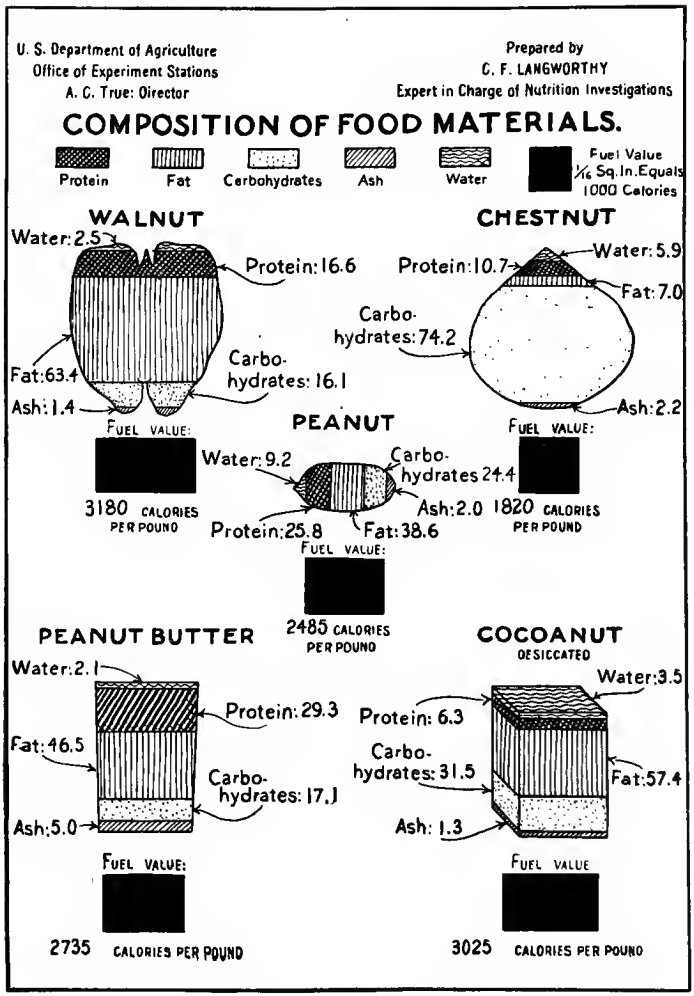
CEREALS AND LEAVENING AGENTS

CEREALS

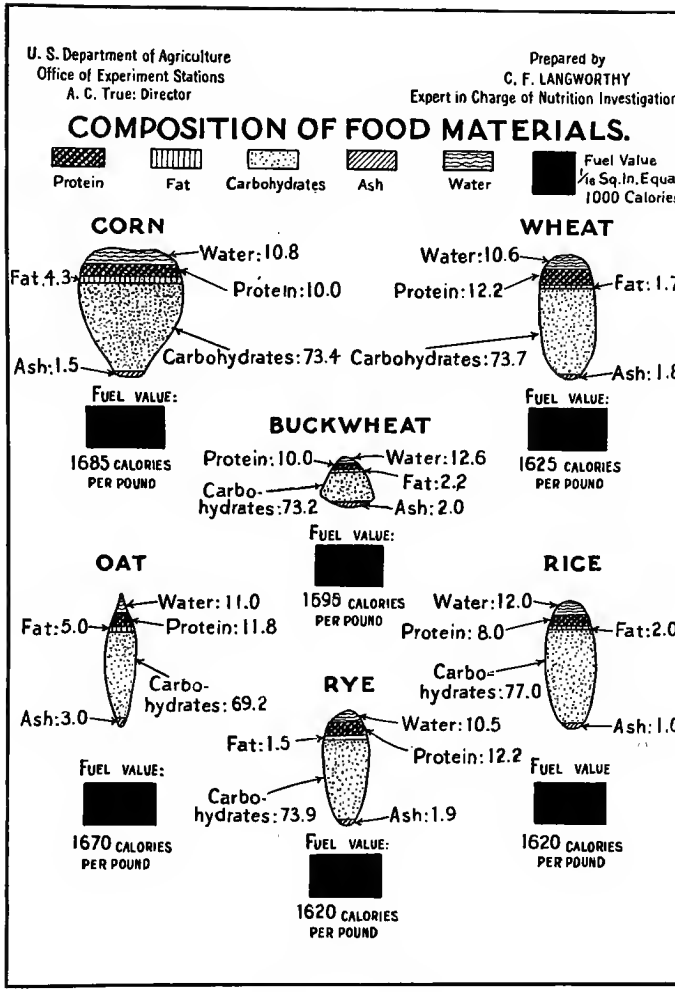
NATURE has a different purpose than providing food for man and animals when she stores nourishment in plants. Her purpose is to provide food for the little embryo plant when it is ready to germinate. So careful is Mother Nature that the germ plant will have just the right kind of food needed for its complete development, that she stores all the food needed for some time in the part called the seed, that surrounds and protects the embryo. To show this, all we need to do is to place any seed, as beans, peas, corn, wheat, between two pieces of cotton flannel, wet the flannel, and place it in a shallow pan like a pie plate. In a short time the plants will develop.

All seeds contain considerable nutrition, and they all contain all the different kinds of food in varying proportion, depending on the protection and food needed for germination. Cereals, legumes, and nuts contain the greatest amount of nutrients, and, because they are so well liked, can be used in so many different ways in cooking, are cheap, easily digested, and furnish a balanced food in themselves, cereals are the most important of all the seeds.

Cereals are defined as the grains or grasses, the seeds of which are used as food. They are, wheat, oats, corn, rice, rye, barley, buckwheat. Wheat is by far the most important of all cereals; corn ranks next.



COMPOSITION OF NUTS.



COMPOSITION OF CEREALS.

All the cereals are similar in structure. They consist of an outer skin which in some cereals includes the bran coats; the endosperm or main body of the grain, which consists of starch, protein, mineral matter, and varying amounts of fat, and which is the stored nourishment of the embryo; and the germ or embryo. The endosperm is the part that is usually used for food, but in some cases, as in the making of breakfast foods, all the grain but the tough outer skin is used.

The typical cereal, wheat, contains 10.6 per cent water, 12.2 per cent protein, 1.7 per cent fat, 73.7 per cent carbohydrate, including 2.4 per cent cellulose, and 1.8 per cent mineral matter. Its protein is in the form of gluten, a substance that is elastic and tenacious. When gas is formed within a mixture made from wheat, other substances and a liquid, the gluten expands, and when heat is applied, the gas expands also, and the result is a light porous loaf. No other cereal except rye has a protein that possesses this power. For this reason when breads are made from corn, the loaf is not so light as wheat bread. Usually half wheat flour is used so as to make a lighter loaf.

Of the cereals, wheat and rye contain the most protein, oats the most fat, rice the most starch, and oats the greatest amount of cellulose and mineral matter, but with the exception of rice their composition is very similar.

It is estimated that cereals furnish nearly one third of all the foods consumed by the American people. They can be manufactured into a great variety of products, and in that way they have a very extensive use. Flour enters, in some way, into almost every article of food prepared, even in the cooking of meats.

THE PRODUCTS INTO WHICH THE CEREALS ARE MANUFACTURED ARE: —

1. Breakfast Foods — oatmeal, rolled oats, cream of wheat, hominy, etc.; also a great variety of prepared and "ready to eat" foods.
2. Starch — corn, rice, wheat.
3. Italian Pastes — macaroni, spaghetti, vermicelli.
4. Glucose — sirup from corn.
5. Cereal Coffee.
6. Flour — wheat, corn, rye, buckwheat, rice.
7. Liquors — malted drinks, beer, whiskey, etc.
8. Feed for Stock.

COOKING OF CEREAL PRODUCTS

Cereal Breakfast Foods. — The length of time required for the cooking of the breakfast foods depends on the size of the particles and the amount of cellulose which the cereal contains. Whole kernels of corn, called hominy, take a much longer time than corn meal; steel-cut oatmeal takes a longer time than Quaker Oats, because the latter has been steam cooked first, and also crushed so that heat can penetrate it more readily. Oat preparations, not steam cooked when sold, require a longer time than wheat or rice preparations, because oats contain more cellulose.

Directions for Cooking. — Breakfast foods should be cooked in a double boiler. Fill the lower part of the double boiler one third full of boiling water. Put boiling salted water in the upper part of the double boiler, and add the cereal gradually, stirring constantly to prevent lumping. Cover and steam according to the directions given below. If the particles of the cereal are finely ground, it is best to mix it with a little cold water first to prevent lumping. Keep the lower part of the double boiler one third full of water. After the water begins to boil, turn

Quantity	Kind	Amount of Water	Time Required	Served with
1 cup	rolled oats or wheat, steam cooked first	2 cups	30 minutes	Baked apples
1 cup	rice	3 cups	30 minutes	Sliced fruit
1 cup	corn meal	3½ cups	1 hour	——
1 cup	cream of wheat	4 cups	30 minutes	Chopped dates
1 cup	hominy, flaked	4 cups	1 hour	Sliced bananas
1 cup	oatmeal, coarse	4 cups	3–4 hours	——
1 cup	whole hominy, soak first	4 cups	4–6 hours	——

the heat as low as possible. It requires very little heat to keep water boiling after it has once reached the boiling point. Use one half to one teaspoon of salt for each cup of cereal.

Serving the Breakfast Foods. — Breakfast foods are served after the fruit course for breakfast, or with the fruit, as suggested in the outline. They are also served as a first course at supper. With fruit, cream, a small amount of sugar, and bread and butter, they make a very appetizing and nutritious breakfast, and the deficiency in protein may be made up at dinner when meat, fish, eggs, or legumes are served as the protein food.

Cereal Products — Starch

This lesson shows the uses of starch as a thickening agent. For this purpose it is used also in sauces and gravies. Flour is sometimes used instead, but it lumps more easily and does not taste as well as cornstarch. In the making of

sauces and puddings, the starch is mixed thoroughly with the sugar before the liquid is added, to prevent lumping.

Cornstarch Mold. — Mix three tablespoons of cornstarch with four tablespoons of sugar in the saucepan, add two cups of milk, mix thoroughly, place on the stove and cook until it thickens (about three minutes after it begins to boil), stirring constantly. Remove from the stove, add one teaspoon of vanilla, and turn into molds or cups that have been rinsed with cold water so that the mold will slip out easily when cold. Let the molds stand until perfectly cold, serve with cream and sugar, or with sliced fruit, as a dessert. Vanilla is always added after the food is taken from the fire, because it is volatile and would evaporate if added while the heat is being applied. In that case, most of the flavor would be lost.

Chocolate Cornstarch Mold. — Melt one half ounce of chocolate, or use two tablespoons of cocoa, add the mixed sugar and cornstarch and milk as given in the recipe for cornstarch mold. Cook and serve in the same way.

Cornstarch Pudding. — Mix four tablespoons of cornstarch with four tablespoons of sugar, add three cups of milk, and cook until it thickens, stirring constantly to prevent lumping. Beat the yolks of two eggs until smooth, add a few tablespoons of the cooked mixture to the egg to apply the heat to it slowly, and mix thoroughly so that the egg will not be cooked in flakes, then add the remainder of the milk and cook one minute. Remove from the stove and add one teaspoon of vanilla. Pour into a baking dish. Beat the whites of the two eggs until stiff and dry, add two tablespoons of sugar, one fourth teaspoon of vanilla, and place it over the pudding. Bake until the egg whites are brown. Serve cold.

When a mixture contains cornstarch and eggs, the cornstarch is cooked first with the milk, and the eggs are added after the mixture has thickened. The reason for this is that all *egg* dishes should be cooked at a low temperature and only enough to coagulate the egg, while starch requires longer cooking.

Cereal Products — Italian Pastes

The foods called Italian Pastes, because they were originally made in Italy, though they are made in this country also, are macaroni, spaghetti, and vermicelli. They are made from a wheat containing a high percentage of gluten. The flour is mixed with water and kneaded to a stiff dough. It is then put into hollow cylindrical presses and forced into tubes of various shapes and then dried. The largest tubes are called macaroni, the next spaghetti, and the smallest vermicelli. These pastes are nutritious foods because the flour has so high a percentage of gluten that a dish of macaroni and cheese is in itself a meal.

Macaroni and Cheese. — Two quarts of boiling water, one tablespoon of salt, one cup of macaroni broken into inch pieces. Cook in a double boiler twenty minutes. Drain, pour cold water over and drain again. Grate or chop cheese. Arrange a layer of macaroni in a baking dish, sprinkle with cheese, put in another layer of macaroni and cheese. Pour one recipe of White Sauce over it. Cover with buttered crumbs, and bake until crumbs are brown.

Spaghetti with Tomato Sauce. — Two quarts of boiling water, one tablespoon of salt, about one cup of spaghetti unbroken. Cook in double boiler until soft, about twenty minutes. Drain and pour cold water over, and drain again. Pour tomato sauce over, heat one minute, and serve.

Hold the sticks of spaghetti in the hand, place the other end of the sticks in the boiling water, and as they soften they will coil in the cooking vessel.

Tomato Sauce. — One pint of tomatoes, one half onion chopped fine. Cook ten minutes. Put through a sieve. Melt four tablespoons of butter, rub in four tablespoons of flour, add one half teaspoon of salt, one eighth teaspoon of pepper, add the tomato, and cook until it thickens.

Cereal Products — Flour

Some of the cereals, wheat, rye, corn, buckwheat, are made into flour. Wheat flour is the only one that is used very extensively. In the process of flour making the outer or bran coats and the germ are removed, and the endosperm is ground into a fine powder. There are various grades of flour, depending on the quality of the wheat, the fineness of the flour, and the amount of bran left in the product. The names mean very little to the average person, because each milling firm coins a name for its best grade of flour and advertises it extensively. The best grades are designated in trade as the fancy patent, standard patent, etc. Whole wheat flour is made by grinding all the grain except the outer bran coats. Some cheap grades of flour are made from the endosperm and germ, some have the finer parts of the endosperm removed, and are made from the remainder.

It is poor economy to buy cheap flour. The best grades of flour absorb more water during bread making, and so not as much flour is needed as when the cheaper grades are used. Cheap flour makes poor bread, and sometimes much of the bread is wasted because it is not appetizing. Good flour is creamy in color, does not hold the impress of the

fingers if held in the hand, and absorbs about 30 per cent its weight of water in bread making.

Pastry flour contains more starch than bread flour. It is made from soft or winter wheat, while bread flour is made from hard or spring wheat. Pastry flour is used for pies, cakes, etc., but a good substitute for it may be made by sifting two tablespoons of cornstarch into each cup of bread flour.

Flour, Leavening Agents, and Shortening

When flour and water are mixed together and baked, the result is a hard, heavy, tough mass that is not appetizing. Flour contains gluten and starch. Gluten is a sticky, tenacious substance that has great expansive power when mixed with the water. Starch swells and gelatinizes when water is added and heat is applied, and tends to become lumpy. To make a light, porous, and tender food, some ingredients must be added that will separate the starch grains and give them room to expand, without lumping, and that will form a gas that can be inclosed in the sticky, tenacious gluten. When heated, the gas will expand. The gluten also has great expansive power, and the heat sets the walls of gluten at the right time, and this makes a light and porous product. If the heat is too strong at first, the gluten hardens before the gas expands it, and the mixture will not be light enough. If the heat is not strong enough to set the gluten, the gas forces its way to the surface and escapes, and the mixture will contain large holes, but will not be light.

Shortening is a fat, as butter or lard, which is rubbed into the flour to separate the starch grains. When the mixture is cooked, the food is flaky and tender.

Kinds of shortening most commonly used are butter, lard, one half butter and one half lard, oleomargarine, olive oil, and various preparations such as Cottolene, Crisco, Wesson's Snowdrift Oil, and butter substitutes.

LEAVENING AGENTS

Leavening means to make light and porous. When steam or carbon dioxide is formed inside the mixture, or when air is inclosed, it expands when heated, and as the heat also hardens the gluten, the result is a light and porous loaf. The leavening agents are steam, soda and sour milk (or any acid), baking powder, eggs and air, and yeast.

Leavening Agent — Steam

Popovers. — When water is changed to steam, it expands many hundreds of times its volume, and if it can be inclosed in walls of gluten so that the substance expands, and yet remains intact, the food product so made will be very light. If the change from water to steam takes place slowly, the expansion will not be very great, for the steam will come to the surface and escape. If the change takes place very quickly and the steam is produced rapidly, the walls of gluten will be stretched to the utmost and the product will be a hollow shell. Eggs are used also in the product, because the albumin coagulates and holds the flour together, and this helps to form the hollow shell. Very strong heat must be used when the steam is utilized as a leavening agent, and it must be continued long enough so that the product is well dried. Popovers should not be soft and moist in any part. Yorkshire Pudding is another example of the use of steam as a leavening agent. It is not baked as long as popovers, because it should be somewhat

soft in the interior. Cream puffs are also made light by expansion of water changing to steam. Milk is used instead of water in popovers, for it is 87 per cent water, and it furnishes flavor and adds to the nutritive value of the food.

Recipe for Popovers. — Mix one and one half cups of flour, and one fourth teaspoon of salt. Make a hole in the center of it; add three unbeaten eggs and one and one half cups of milk. Stir until all lumps are out of the flour and the mixture is smooth. Turn into muffin pans and bake from thirty to forty minutes in a hot oven. This recipe makes twelve popovers. Popovers are made light by the water in them turning to steam. The strong heat causes the steam to form rapidly, and this produces a hollow shell. The egg coagulates and helps to form the shell.

Leavening Agents — Eggs Inclosing Air

Whites of eggs are beaten with an egg beater to entangle or inclose air. To estimate the amount of air inclosed by beating, note the amount of space occupied in the bowl by one egg white before you start to beat it, and then note the change in volume after the white has been beaten until stiff and dry. Unlike water, air does not require a great amount of heat for expansion. Albumin does not require a strong heat for coagulation, — about 170° F., — and it is toughened by too high a temperature. When air, inclosed in eggs, is used as a leavening agent, the food should be cooked at a low temperature.

Leavening Agents — Eggs and Air

Omelet. — Three eggs, three tablespoons of water, one fourth teaspoon of salt. Separate yolks from whites.

Beat yolks until thick. Beat whites until stiff and dry. Add water and salt to yolks, and fold in the whites. Put one tablespoon of butter in the omelet pan, turn in the egg mixture, and cook slowly. When well puffed out, place in the oven to finish cooking. Whites and yolks of eggs are beaten separately, and the whites are beaten stiff so as to inclose as much air as possible. The omelet is cooked with slow heat to expand the air and coagulate the albumin at as low a temperature as possible (170° F). Intense heat toughens the albumin and coagulates it too soon, there is no expansion of air, and the omelet is tough and flat.

Leavening Agents — Soda and Sour Milk

When two substances like sodium bicarbonate (soda) and sour milk are mixed together, a chemical change takes place and new substances unlike either of them are formed. One of these substances formed is a gas, carbon dioxide (CO_2), which expands when heated and makes food light and porous. When an acid and an alkali are brought together, one tends to neutralize or destroy the characteristic properties of the other. The acid, sour milk, neutralizes the alkali, soda, and no taste of either is left in the food. They are used to form the gas CO_2 so as to make the food light. This gas is formed as soon as the substances are brought together. It expands when heated, and enough heat must be applied to set the walls of gluten so that the bubbles will not collapse. When hot water is added to soda ($NaHCO_3$), the gas CO_2 is given off, but the soda is not neutralized, and the food to which it is added has a bitter taste. It is better to sift the soda into the flour, rather than add it to the sour milk, because when the gas forms so quickly, some is lost before the mixture is put in

the oven. Just enough alkali and acid are used to neutralize each other. This can be determined by the use of litmus paper. One half teaspoon of soda neutralizes one cup of sour milk. Other acid substances may be used in place of sour milk, as buttermilk, molasses, and lemon juice.

Batters and Doughs

A mixture of flour and liquid is called either a batter or a dough, depending on the proportion of liquid to flour. Batters consist of from one to two measures of flour to one measure of liquid, and are named either pour or drop batters according to the amount of flour used. Doughs consist of from two and one half to three and one half measures of flour to one of liquid, and they are classed as soft and stiff doughs. Biscuit is a soft dough; bread is a stiff dough.

Batters contain some leavening agent which is sifted in with the flour. They must be beaten thoroughly so as to inclose as much air as possible. When equal quantities of flour and water are mixed together, the flour tends to lump unless some precaution is taken to prevent it. For this reason, when mixing a batter, sift flour, salt, and leavening agent together, then add about one third of the liquid and press out all the lumps by rubbing the bowl of the spoon against the side of the bowl. Slowly add the remainder of the liquid, and when the batter is perfectly smooth, add eggs and melted butter and begin to beat. Beat with long, deep strokes which take the spoon through to the bottom of the bowl, so as to inclose the air. Never stir a mixture after you have started to beat it, because stirring breaks up the air bubbles that are already formed

and they escape to the surface. When the mixture is well beaten, the heat applied will expand the air and the eggs, the gluten will coagulate, and the product will be light and porous.

Doughs are usually mixed differently from batters when they contain shortening, sugar, and other ingredients. The shortening is creamed or softened first so that when the sugar is added it will be partially dissolved. Creaming is rubbing the butter or lard against the side of the bowl, with a spoon, until it is soft as cream. The sugar is then added slowly, and carefully rubbed into the butter.

Biscuit dough is mixed in an entirely different way. The flour, salt, and leavening agent are mixed first, and then the shortening is cut in.

(Pupils should read a recipe through before they begin to work. All ingredients should be measured and ready before attempting to put things together. Measure the dry ingredients, not including sugar, first, and sift together. To add alternately means to add part of the liquid, then part of the flour, and beat them in thoroughly before adding more.)

FLOUR — LEAVENING AGENT — SODA AND SOUR MILK

Griddle Cakes. (Pour Batter.) — Sift together two cups of flour, one half teaspoon of salt, one teaspoon of soda; add one and three fourths cups of sour milk, and rub free from lumps, add one well-beaten egg and two tablespoons of melted butter, and beat well. Have the pancake griddle smoking hot, grease it with lard or with a piece of fat pork, using only enough fat to grease the pan. Drop the batter by tablespoons on the hot griddle. Let the cakes cook until they are full of bubbles and browned at the

edges, then turn and brown the other side. Pancakes should be turned but once. Serve immediately with butter, sugar, sirup, or gravy from sausage.

Corn Bread or Johnny Cake. (Drop Batter.) — Sift together one cup of corn meal, one cup of flour, one fourth teaspoon of salt, one half teaspoon of soda. Add one cup of sour milk, and free from lumps. Add four tablespoons of molasses, one egg well beaten, four tablespoons of melted butter, beat well. Turn into a shallow pan that has been buttered, and bake thirty minutes in hot oven.

Ginger Bread (Soft Dough). — Cream one half cup of shortening (butter, lard, one half butter and one half lard, or oleomargarine), add one half cup of sugar and work the shortening and sugar together. Add one cup of molasses, two well-beaten eggs, and one cup of sour milk alternately with three cups of flour, one half teaspoon of soda, one teaspoon of ginger, and one fourth teaspoon of salt sifted together. Beat well. Bake in buttered shallow pan, in hot oven, for thirty minutes.

Baking Powder

Baking powder is a mixture of the alkali sodium bicarbonate, some acid powder, and starch. The soda furnishes the gas, carbon dioxide, which is the direct leavening agent. When moisture is added, the acid acts on the soda, and liberates the gas. A mixture of soda and acid powder reacts slowly in moist air, thus losing strength. Starch is added to prevent such interaction, until the baking powder is used in cooking. One and one half to two level teaspoons of baking powder are usually used to each cup of flour.

Baking Powder may be grouped in three classes: —

1. Cream of Tartar Baking Powder.
2. Phosphate Baking Powder.
3. Alum Baking Powder.

Cream of tartar baking powder is made from cream of tartar (acid potassium tartrate), soda, and starch. It is the best-known baking powder and probably the most wholesome to use, because it leaves no harmful products in the food. It forms carbon dioxide (CO_2), water (H_2O), and Rochelle salts, — a mild laxative when taken in small quantities.

Phosphate baking powder is made from acid calcium phosphate, soda, and starch. The only objection to its use is that the gas is liberated so quickly that much is lost before the food can be put into the oven.

Alum powder is made from potash alum or ammonium alum, soda, and starch, and its sale is prohibited in some states because of the harmful effects of alum on the human system, though the alum is decomposed when soda is added.

From the accompanying table, which shows in what proportion to mix the ingredients for the three kinds of baking powder, it will be seen why alum baking powder is cheap and can be sold for twenty-five cents a pound and cream of tartar baking powder is necessarily higher in price. Baking powder can be made at home at one half the price paid for it in the stores. The ingredients should be thoroughly mixed, sifted, and packed in air-tight cans.

CREAM OF TARTAR POWDER

Cream of tartar (acid potassium tartrate)	1 pound	$.40
Soda	½ pound	.05
Starch	½ pound	.05
	2 pounds	$.50

PHOSPHATE POWDER

Soda	1 pound	$.10
Calcium acid phosphate	1½ pounds	.45
Starch	1 pound	.10
	3½ pounds	$.65

ALUM POWDER

Soda	1 pound	$.10
Alum	¾ pound	.07½
Starch	2 pounds	.20
	3¾ pounds	$.37½

Baking Powder Biscuit and Variations. — These variations of biscuit are shortcake, dumplings, fruit pudding, fruit roll, pin-wheel biscuit, Dutch apple cake, nut bread, meat pie. They are made like a biscuit dough, but differ in the amount of shortening, liquid, or sugar used.

NOTE. — The teacher may teach as many of these recipes as she has time for. The most important at this time are biscuit, apple dumplings, and shortcakes, because they give practice in handling the dough and perfecting the pupils' knowledge of biscuit making. The other recipes may be worked in when lessons that require long cooking are given and the pupils have little work to do. Such lessons are those on cooking of legumes and the meat lessons. Another reason for giving several recipes that may be used later in the work is that a review of a process impresses it on the mind. For the same reason more recipes are often included than the teacher can use with some classes. Usually one recipe constitutes a lesson, for a ninety-minute period, if some time is devoted to recitation.

Baking Powder Biscuit. — Mix and sift together two cups of flour, four teaspoons of baking powder, one half teaspoon of salt. Add four tablespoons of butter or lard, and work it in with a fork, until it is perfectly blended and the flour is flaky. Make a well in the center of the flour, and pour in three fourths cup of milk or water. Start in the center and stir with a fork, in widening circles, until

all the flour has been gathered in and the result is a soft dough. Turn the dough on the floured molding board, and roll lightly about one inch thick, cut with a small biscuit cutter, and bake twelve to fifteen minutes in hot oven.

Hot Biscuit.

Shortcake. — Mix and sift together two cups of flour, four teaspoons of baking powder, one half teaspoon of salt, add six tablespoons of butter, and work it in as in biscuit dough. When thoroughly mixed, add three fourths cup of water or milk and stir from the center. Turn on the floured molding board, roll out in one cake, and place on a pie tin. Bake twenty to twenty-five minutes in a hot oven. When baked, split so as to separate top and bottom, spread with butter and strawberries, sliced peaches, oranges, or any other fruit desired. Place the upper crust on the fruit, the buttered side up, and spread with another layer of fruit. May be served with whipped cream.

Apple Dumplings. — Mix and sift together two cups of flour, four teaspoons of baking powder, one half teaspoon of salt. Add eight tablespoons of butter, or lard, as in biscuit, and one half cup of milk or water. Roll out about one fourth of an inch thick. Pare and core six tart apples. Cut dough large enough to fold over an apple. Place the apple on the dough, fill the center of the apple with sugar, and add a speck of nutmeg or cinnamon. Fold the dough entirely over the apple, and press it firmly together. Bake

about forty-five minutes in a hot oven; the time required depends on the kind of apple used. To be certain that the apple is cooked, pierce with a fork, and if the apple feels soft, it is cooked. Serve apple dumplings with Vanilla Sauce.

Vanilla Sauce. — Mix thoroughly one tablespoon of cornstarch, one half cup of sugar, speck of salt; add one cup of boiling water and one tablespoon of butter. Cook until it thickens, stirring constantly. Add one teaspoon of vinegar and one half teaspoon of vanilla.

Fruit Roll. — Mix and sift together two cups of flour, four teaspoons of baking powder, one half teaspoon of salt, and one tablespoon of sugar. Add six tablespoons of butter or lard, and three fourths cup of water or milk as in biscuit. Roll out one half inch thick, spread with sliced peaches or berries. Roll up as for jelly roll, and bake in a hot oven thirty minutes. Serve with Hard Sauce.

Dutch Apple Cake. — Use the same recipe as for Fruit Roll. Roll out one half inch thick. Place in a shallow baking pan. Pare tart apples; quarter and slice in one quarter inch slices. Place the apples on top of the dough, arranging them in even rows so that they overlap. Sprinkle with sugar and cinnamon and bake thirty minutes. May be cut into squares and eaten as hot bread, or served as dessert with Lemon Sauce.

Lemon Sauce. — Mix one tablespoon of cornstarch and one half cup of sugar; add one cup of boiling water and one fourth cup of butter; cook until it thickens. Add juice of one lemon and boil one minute, or add one teaspoon of lemon extract after the sauce is removed from the fire.

Fruit Pudding. — Make one half the recipe for Fruit Roll. Place sliced apples, blueberries, or peaches in a baking

dish or pudding pan; add sugar and enough water to cover the fruit. Drop the dough on top of the fruit and spread smooth. Bake thirty minutes in a hot oven. Serve with pudding sauce or cream and sugar.

Nut Bread. — Mix and sift together one and one half cups of graham flour, one and one half cups of white flour, four teaspoons of baking powder, one teaspoon of salt, three fourths cup of sugar. Add one and one half cups of milk, beat well, and add one cup of chopped nuts. Let it stand twenty minutes. Bake one hour.

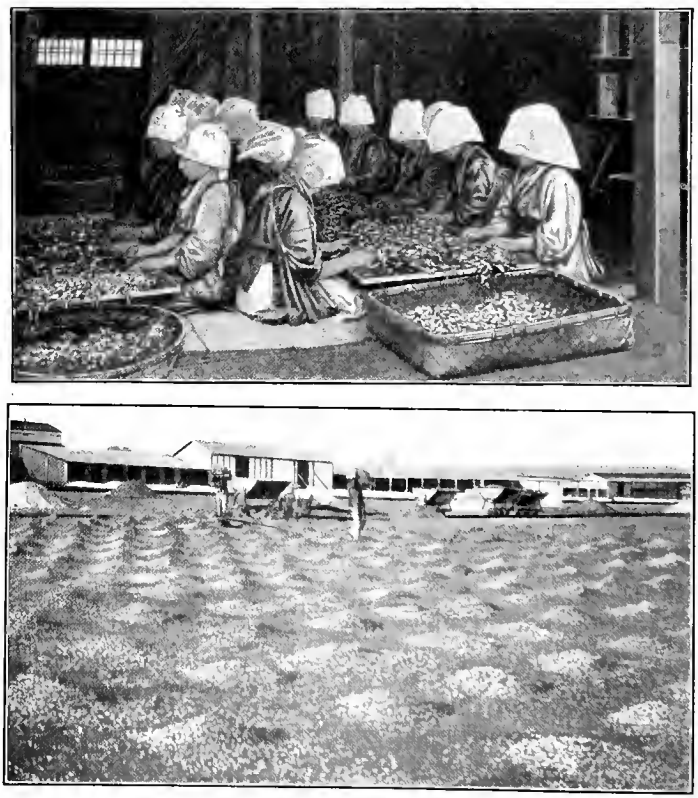
Dumplings for Meat Stew. — Mix and sift together two cups of flour, four teaspoons of baking powder, one half teaspoon of salt. Add two tablespoons of lard, and work it in as for biscuit dough. Add three fourths cup of water, and shape into six dumplings. Place on top of meat stew, and boil twenty minutes. Some stews require less shortening than others; the amount used depends on the amount of fat on the meat used for the stew.

Muffins. (Mix as batter.) — Mix and sift together one and three fourths cups of flour, three teaspoons of baking powder, one half teaspoon of salt, two tablespoons of sugar. Add one cup of milk, and press out all lumps. Add two well-beaten eggs and four tablespoons of melted butter. Beat until very light, bake in greased muffin pans twenty minutes in a hot oven.

Blueberry Muffins. — Mix and sift together two cups of flour, three teaspoons of baking powder, one half teaspoon of salt, two tablespoons of sugar. Add one cup of milk as in plain muffins, then add one egg well beaten, and one tablespoon of melted butter; beat well. Lastly add one cup of blueberries. Bake thirty minutes in a hot oven.

Corn Meal Muffins. — Mix and sift together one cup of flour, three fourths cup of corn meal, one half teaspoon of soda, one half teaspoon of salt, add one cup of sour milk, one well-beaten egg, two tablespoons of melted butter, and beat well. Bake thirty minutes in a hot oven.

Whole Wheat Muffins. — Use Whole Wheat instead of corn meal in the above recipe.



SORTING TEA AND DRYING COFFEE.
(From Carpenter's *How the World is Fed.*)

CHAPTER VII

BEVERAGES AND PLANNING AND SERVING A BREAKFAST

BEVERAGES

Water. — Water is one of the five important classes of foods, and though it does not supply heat and energy to the body, it aids in all bodily processes and constitutes nearly three fourths of the weight of the body. Foods are from 50 per cent to 90 per cent water.

Some of the most important uses of water are: to dissolve foods so that they can be digested and absorbed, to carry away the waste matter, to regulate the temperature of the body, and to enter into the composition of the blood, digestive fluids, and tissues.

Two kinds of water are used for drinking purposes, — hard water, which contains lime that has been dissolved from limestone through which the water passes, and soft water. Other mineral substances are dissolved in water, and the famous mineral springs of our own country and Europe furnish mineral waters used for medicinal purposes.

Water sometimes contains organic impurities. It is then a common carrier of disease germs. The germs of typhoid fever are carried in water, and the causes of epidemics of the disease are universally traced to impure water and milk supply. The germs of several other diseases are also carried in water, and if, for any reason,

it is thought that the water supply is contaminated in any way, the water should be boiled for twenty minutes and then bottled and cooled for use. It is always best to boil water that is to be given to infants. In both cases, where the water supply is known to contain impurities, and when the water is to be given to infants, the precaution of boiling it first is a good application of the old adage, "an ounce of prevention is worth a pound of cure."

Of all beverages, water is the best, and very few people drink enough of it. About four pints should be taken daily to equalize the loss through the excretory organs. A glass of hot water taken the first thing in the morning washes the mucus from the stomach and aids excretion. The two most common beverages served, tea and coffee, have no food value, and if hot water could be used in place of them, the nervous system would be greatly benefited. Tea and coffee are stimulants, and while they probably do no harm to grown people if taken in moderation, they are harmful to children.

Cocoa and chocolate are foods, and when made with milk the food value is increased. Lemonade is a refreshing drink, and furnishes vegetable acids to the body. The same may be said of all fruit beverages made from fresh fruit.

Coffee. — Use two level tablespoons of coffee for each cup of boiling water. Put the coffee in the coffee pot and add enough cold water to moisten the coffee and make it stick together, about a teaspoon of water to each tablespoon of coffee. Pour the boiling water over the coffee, and let it boil for three minutes. Place it where it will be kept hot, but not boil, for five minutes more, and then serve.

Tea. — Scald a porcelain, earthenware, or china teapot with boiling water to thoroughly heat the teapot, and then turn

the water out. Use a level teaspoon of green or black tea for each cup of water. Put the tea in the hot teapot. Pour boiling water over it, and let it stand two or three minutes, and then serve. Never let tea boil. Do not let it stand on the hot stove. Tea should be served as soon as it is made.

Lemonade. — Wash the lemons thoroughly. Use one lemon for two glasses of lemonade. Cut the lemons in halves, squeeze the juice out with a lemon squeezer, and add three tablespoons of sugar to each lemon. Mix the lemon juice and sugar thoroughly; add some chopped ice and the cold water. Serve ice-cold. Some slices of lemon may be added for appearance and because the volatile oil in the skin adds to the flavor.

Cocoa. — Mix one tablespoon of cocoa with one tablespoon of sugar, add one cup of boiling water gradually, and boil five minutes. Add one cup of milk, and let it come to the boiling point, and serve. Some tastes demand more sugar, but it may be added by each individual at the table.

Chocolate. — Melt one square of chocolate slowly so as to prevent burning, add two tablespoons of sugar and mix together, add one cup of boiling water and boil three minutes, add one cup of milk, bring to the boiling point, and serve.

Fruit Punch. (Recipe makes about 3 quarts of punch.) — Boil two cups of sugar and one quart of water fifteen minutes. Add one cup of orange juice, two cups of lemon juice, one half cup of grated pineapple, and dilute with one quart of iced water.

NOTE TO TEACHERS. — After pupils have learned to prepare fruits, cereals, hot breads, and beverages, some practice should be given in planning, calculating the cost, and serving breakfasts, so that the work is unified and the pupils can practice and apply at home what is learned at school.

One of the hardest problems for the young housekeeper is to prepare several dishes so that they will all be in proper condition to serve at a given period of time.

Breakfast may first be planned as part of a class exercise, and some day following, groups of two or three may prepare simple breakfasts.

A lesson in table setting, serving, and table manners may be given in the regular classroom at the individual tables. After one or two lessons are given in the classroom, practice could be given in preparing and serving breakfasts during the noon hour.

SUGGESTIONS FOR PLANNING A BREAKFAST[1]

A breakfast should consist of: —

I. Fruit in some form, preferably fresh.

II. Cereal, best from the whole of the grain, and cheapest if purchased unprepared for use.

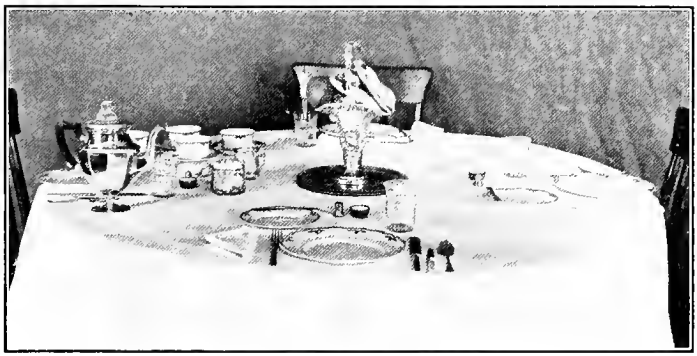
III. Some protein dish, as eggs, fish, hash, or a small quantity of meat. Unless eggs are very high in price, they are always better and cheaper than meat for breakfast.

IV. Some form of bread, as toast, bread, muffins, biscuit, popovers, griddle cakes, rolls, etc.

V. A hot drink, as coffee or cocoa, if desired.

The cost of food should not exceed eight cents per person, and the meal may be planned so that the cost will not exceed five cents per person. Fruits and eggs should be served in season, for then the prices are moderate. Uncooked breakfast foods cost less than half what prepared foods cost, and they may be cooked in the fireless cooker the day before, thus saving time in preparation. Dried fruits, as dates, figs, and prunes, may be chopped and added to the cereal.

[1] From Conley's *Nutrition and Diet.*



A Breakfast Table.

Toast, rolls, and griddle cakes take less time to prepare than muffins, popovers, and biscuits.

A breakfast should not take more than thirty minutes to prepare. This should include laying the table and all preparatory work.

SERVING A BREAKFAST

MENU

Muskmelon

Cream of Wheat — Cream and Sugar

Ham and Eggs — Bread and Butter

Coffee

Time for Preparation

12.00 Boil water for cereal.
12.05 Put cereal on to cook.
12.10 Lay table.
12.15 Prepare melon and put in a cool place.
12.20 Prepare ham and start to fry it.

12.25 Make coffee.
12.28 Pour water and put butter on plate.
12.30 Serve melon.
12.35 Serve cereal.
12.40 Serve ham and eggs, coffee and bread.
1.00 Clear table.

Materials Needed

3 melons.
1 recipe for Cream of Wheat.
½ pint of milk.
½ pint of cream.
1½ pounds of ham.
8 eggs.
1 loaf of bread.
3 ounces butter.
8 tablespoons (level) coffee.
Loaf and granulated sugar.

Materials for Serving

1 silence cloth.
1 linen tablecloth.
6 linen napkins.
1 large centerpiece — 2 small doilies.
6 silver knives.
6 silver butter spreaders.
6 silver forks.
18 silver teaspoons.
1 carving set.
1 tablespoon.
1 sugar tong.
1 sugar shell.
6 water glasses — 1 water pitcher.
6 cups and saucers.
1 creamer and 2 sugar bowls.
6 service plates.
6 fruit plates.
6 bread and butter plates.
6 breakfast plates.
6 cereal dishes.
1 bread plate.
1 platter.
3 salt and pepper shakers.
1 flower vase.

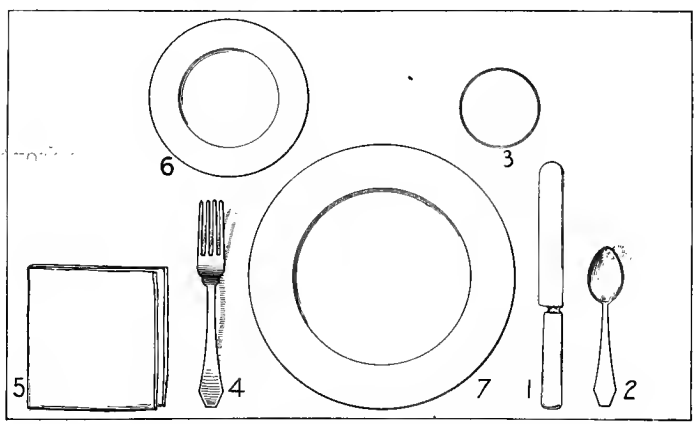
Laying the Table

Spread a heavy cover of felt or canton flannel over the table. Have it long enough so it extends over the sides, and allows for shrinkage when it is washed. This cloth is to protect the polished table from heat of dishes, to deaden the sounds, and to give body to the tablecloth. Spread

the linen tablecloth over this cover, so that the fold in the center of the tablecloth comes exactly in the center of the table, and so the cloth overhangs the same distance on each end.

Place a centerpiece in the center of the table, and place on it a small growing plant, as a fern, or cut flowers, or, at breakfast, place the fruit dish there.

When laying the table allow at least 25 inches for each



THE COVER.

1, knife; 2, spoon; 3, water glass; 4, fork; 5, napkin; 6, bread and butter plate; 7, plate.

"cover." By cover is meant the knives, forks, spoons, plate, napkin, and glasses needed for each person.

Place the plate in the center of the cover. At the right of the plate, one half inch from the edge of the table, place the knives needed for the meal, having the cutting edge of the knife toward the plate, and knife which is to be used first, farthest from the plate.

At the right of the knives place the spoons needed, bowls

upward. Place in order designated for the knives, the first to be used on the outside.

At the left of the plate place the forks, tines upward. Place in same order as designated for the knives.

Place napkin to the left of the fork.

Place water glass at the point of the knife.

Place individual bread and butter plate to the left of the fork above the napkin.

Place carving knife and fork and serving spoons at the head of table, in front of the "cover."

Place the service for tea or coffee at the foot of the table, in front of the cover. Coffee or tea service consists of cups, saucers, sugar bowl, and cream pitcher.

Individual salt shakers or cellars may be placed in front of each plate.

Waiting on Table

Fill water glasses three fourths full, place butter on bread and butter plates, and cut bread one minute before the meal is ready to serve.

All dishes from which a person helps himself are passed at the left side and low enough to be easily reached, as sauce, gravy, bread, etc.

All dishes served in individual portions are placed from the right side, as coffee, plates, etc.

All dishes are removed from the right.

Water glasses should be kept filled throughout the meal.

Clearing the Table

Remove the dishes containing unserved food first, then remove everything from each cover that pertains to that

course, then remove all clean silver, dishes, etc. Everything that pertains to one course is removed before another course is served. Do not pile dishes on tray.

Remove two covers at one time, one in each hand until all are removed.

Brush crumbs from table before serving the dessert.

ADDITIONAL BREAKFAST MENUS

Oranges
Pettijohn's Breakfast Food

Popovers — Omelet — Coffee

Baked Apples
Rolled Oats

Bacon — Muffins — Doughnuts

Coffee

Stewed Prunes
Shredded Wheat Biscuit

Creamed Codfish — Toast

Coffee

Cream of Wheat and Chopped Dates
Poached Eggs on Toast
Coffee

Baked Pears
Hominy Flakes

Rolls — Coffee

CHAPTER VIII

CEREALS AND LEAVENING AGENTS *(Continued)*

LEAVENING AGENT — YEAST

YEAST is a tiny plant which thrives best in warm, moist atmosphere at a temperature of 70° to 90° F. Cold renders it inert, but does not destroy it, and when it is again put in a warm atmosphere it begins to grow. Boiling, or even a temperature of 170° F., destroys the plant.

Yeast contains a ferment which feeds on the sugar in the flour and decomposes or breaks up the sugar in carbon dioxide (CO_2), and alcohol. A small amount of sugar is found in flour. The ferment diastase which occurs in grains changes more starch to sugar during the fermentation. Some sugar is added in bread making, though that is not necessary.

The gluten in the flour has great expansive power, and in addition to its elasticity it is very tenacious. The carbon dioxide gas forms in the dough, and the cohesiveness of the gluten holds it so that the whole mass becomes impregnated with gas and increases to several times its bulk. It is then said that the dough is light.

Other ferments are present in the dough also, and under favorable conditions they become active. For this reason the dough must be watched and kneaded when it has become light, or the other ferments will act and produce sour bread. This is one reason why a temperature over 90° F. is not best for bread making. The undesirable ferments

thrive best at the higher temperature, and that produces a bread not as well flavored as bread raised at 70° to 90° F.

When bread is made from milk, the milk is scalded, to destroy some bacteria which are present. Salt also delays the development of undesirable organisms, in addition to flavoring the bread. Salt was used in the old process called " salt raising " that was in vogue before compressed yeast was made. The liquid to be used in bread making was exposed to the air so that the yeast germs would enter, and salt was used to retard the growth of the other organisms until the yeast started to develop. When froth or gas formed, it was a sign that the yeast was at work, and so the dough was prepared.

Experiments with Yeast. — Mix some water and molasses, in proportion of ten parts water to one part molasses. Add a little compressed yeast to the mixture.

1. Place one third of the mixture in a test tube and put it in a cold place and note whether there is a formation of gas. After several hours heat to a temperature of 90° F., and note result.

2. Place one third of the mixture in another test tube and keep at a temperature of 70°–90° F., and note result.

3. Place one third of the mixture in another test tube and boil the mixture and then place in a warm place and note whether gas forms.

What conclusion can be drawn as to the best temperature for the development of yeast and for bread making?

Experiments with Kinds of Yeast. — Mix one fourth cake of compressed yeast with one tablespoon of lukewarm water, add one half cup of lukewarm water, and beat in one cup of flour. Note the length of time that it takes the mixture to become light.

Repeat the same experiment with one fourth dry yeast cake and note result.

Bread Judging

Several points are to be noted in determining the essential characteristics of a good loaf of bread.

1. **Shape and Size of Loaf.** — A loaf should not be too large to bake evenly, and not so large that the slices are awkward to handle. The best-sized pan for baking is about 10 inches long, 4 inches wide, and 5 inches high. The loaf should rise evenly, be slightly rounded in the middle, but of uniform height throughout. It should not spread over the side of the pan. This characteristic indicates that the bread was allowed to rise too long, or that the oven was too slow.

2. **Color of Crust and Crumb.** — The crust should be a uniform golden brown, on top, bottom, and sides. The crumb should be of a creamy color and should have no dark spots or streaks.

3. **Flavor.** — The bread should not taste of yeast and should have no suspicion of sourness either in smell or flavor. It should have a sweet nutty taste.

4. **Lightness, Texture, and Grain.** — The bread should be uniformly light throughout. It should have fine uniform pores and no large holes.

5. **Doughiness and Moisture.** — A good loaf of bread should not be dry enough to crumble nor moist enough so that the crumb forms a ball when rolled. When a good loaf of bread is cut, the crumb should be soft enough so that when it is pressed with the finger it dents easily, but springs back readily to an even surface.

To make good bread, good flour and fresh yeast should be used, and attention should be given to kneading, raising, baking, and care of the loaf after it is removed from the oven. No other food is as good as a good loaf of bread.

Bread and Rolls

Bread may be made in two ways, by setting a sponge and allowing it to rise overnight and then kneading it, or by kneading it to a dough immediately. By using a sponge, less yeast is required, as a longer time is allowed for the yeast to grow. On the other hand, the disadvantage of sponge dough is that when allowed to stand overnight it may become chilled, because a temperature of 70° F. cannot always be maintained, or it may become overripe and hence sour.

Sponge is used for making rolls, muffins, etc., as the butter and eggs will mix more readily in sponge, and the result will be a lighter product.

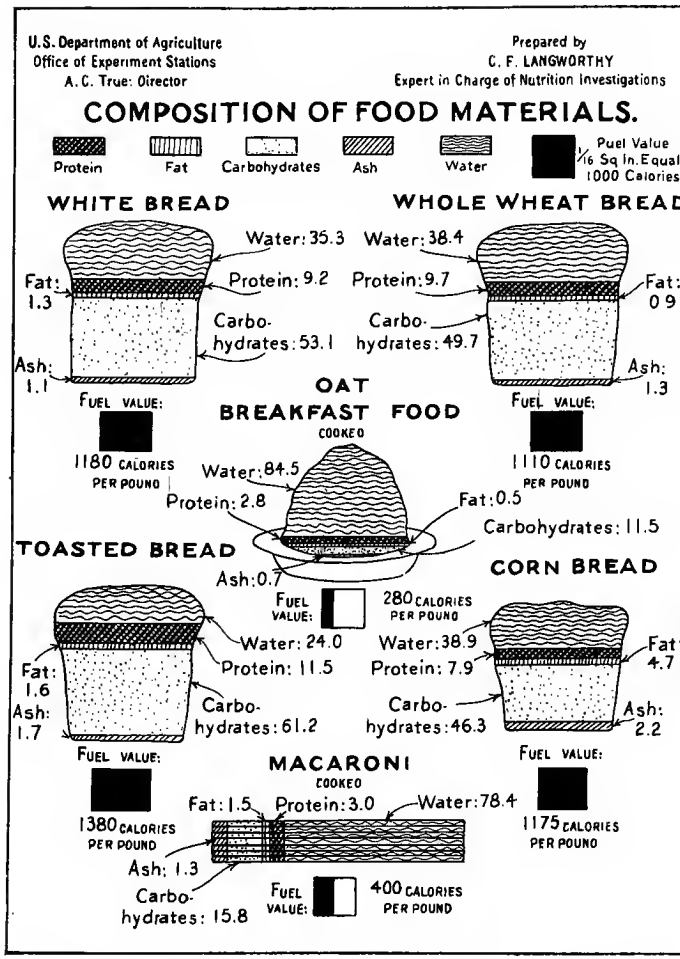
Bread. — Mix one cake of compressed yeast with four tablespoons of lukewarm water (98° F.). To two cups of lukewarm water or milk, or half milk and half water, add one level teaspoon of salt, one level tablespoon of sugar, one level tablespoon of lard, and the yeast. Stir in enough flour (about three cups) to make a batter, and beat until smooth and full of air bubbles. Then add three or four cups of flour, or enough to make a stiff dough, and knead thoroughly. Continue kneading until the dough does not stick to the hands or the board, until it rises quickly when indented with the hand, until it feels smooth, elastic, and spongy. When this is satisfactory, place the bread in a bowl or bread raiser. Keep it at a temperature of from 70° to 75°, and let it rise until it doubles its bulk, about three hours. Then take it from the bowl and shape into two loaves, using no more flour. Place the bread in pans, and let it rise until it has doubled its bulk (about one hour), and then bake it. When the bread is put into the oven,

the heat should not be very great. The bread should continue to rise during the first fifteen minutes, because if the crust becomes too hard it prevents expansion and the bread will be heavy. After the first fifteen minutes the heat should be increased so that the bread will brown properly, and during the last fifteen minutes it can be decreased again. Bread should be baked from 50 to 60 minutes. If a crisp crust is desired, do not cover the bread when it is taken from the oven. To glaze the loaves, rub them with a damp cloth before taking from the oven, and allow them to dry.

Using milk instead of water in bread making adds to the nutritive value of the bread and makes a sweeter loaf.

Bread Recipe II. Sponge Dough. — To set sponge: Use one cake of yeast foam or one half cake of compressed yeast for two loaves of bread. Mix the yeast with four tablespoons of lukewarm water. Use two cups of lukewarm liquid, one level teaspoon of salt, one level tablespoon of sugar, one level tablespoon of lard, and add the yeast. Stir in about three cups of flour, and beat until smooth and full of bubbles. Let stand at a temperature of about 70° until light. This may be set at night, and then in the morning more flour is added and the bread is kneaded as in the previous recipe.

Boston Brown Bread. — One cup of rye flour, one cup of corn meal, one cup of whole wheat flour, or (one and one half cups of graham flour and one and one half cups corn meal), two level teaspoons of soda, two level teaspoons of salt, three fourths cup of molasses, one pint of sour milk. Sometimes a half cup of raisins is added. Mix and sift flour, meal, salt, soda; add molasses and milk, and beat well. Place in a mold and steam three hours.

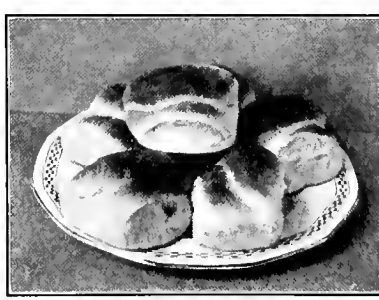


COMPOSITION OF BREAD.

Coffee Cake. — One yeast cake dissolved in four tablespoons of cold or lukewarm water, one fourth cup of butter or lard, or half butter and half lard, one fourth cup of sugar, one half teaspoon of salt, one egg, one cup lukewarm milk or water.

Put butter, sugar, salt, and milk into the mixing bowl; stir until melted; add yeast and one and one half cups of flour. Beat until smooth and full of bubbles; add the beaten egg and enough more flour to make a bread dough (about one and one half or two cups), and knead as for bread. Let it rise until double its bulk (about three hours). Take from the bowl and knead slightly, and roll with the rolling pin until it is about one inch thick. Place in a pan, and let it rise one hour. Brush the top with three tablespoons of melted butter, one fourth cup of sugar, one teaspoon of cinnamon, and bake about twenty minutes.

Swedish Rolls. — Use same recipe as for Coffee Cake. Roll out as for Coffee Cake; brush the top with melted butter, sprinkle with sugar, cinnamon, and currants. Roll the dough and cut pieces one half inch thick. Place in pan until light, and bake one half hour. When baked, brush the top with equal parts of sugar and milk to glaze.



PARKER HOUSE ROLLS.

Parker House Rolls. — Two cups of scalded sweet milk, four tablespoons of butter, four tablespoons of sugar, one teaspoon of salt, one yeast cake dissolved in one fourth cup of water, whites of

two eggs. Add butter, sugar, and salt to milk; when lukewarm, add yeast and three cups of flour. Beat thoroughly, add egg whites, and finally add flour to knead. Let rise. Toss on board and knead and roll out one third inch thick. Shape with a biscuit cutter dipped in flour. Dip the handle of case knife in flour. Crease middle. Brush over one half with melted butter. Fold and press the edges together. Place in greased pan one inch apart. Bake twelve to fifteen minutes.

Pies

Pie crust is made from flour, salt, shortening, and a very small amount of water. As it contains no leavening agent, it needs only enough water to hold the particles of flour together. It is made by the same method that biscuits are made. The shortening is cut in with a fork, though some prefer the method of using two knives and chopping it in. Shortening should never be worked in with the hands, because the heat of the hand melts or softens the shortening.

Pie Crust. — Mix and sift together one cup of flour, one fourth teaspoon of salt. Add six tablespoons of lard, and work it in thoroughly with the fork so that the lard surrounds the particles of flour and separates them. When well mixed so that the flour is flaky, add about one and one half tablespoons of water, just enough to moisten the flour so that it can be rolled, divide the crust into two parts, and roll thin.

Apple Pie. — Line a greased pie plate with crust. Pare and core four or five apples and cut them in very thin slices. Place them on the pie plate about one fourth inch from edge, till the center slightly rounds. Sprinkle one

third cup of sugar over the apples, and nutmeg or cinnamon to taste. Roll out the upper crust, and cut small gashes in it so as to allow the steam to escape. Press the two crusts together with a fork or pastry jagger. Place the pie in a hot oven for five or ten minutes so that the crust will set, then reduce the heat and bake in a moderate oven thirty-five to forty minutes. The baking is done in a moderate oven so that the heat will reach the apples.

Lemon Pie. — Line a plate with crust and have it extend one half inch above the edge so as to hold the filling in place. Pierce the bottom of the crust with a fork, place the crust in the oven, and bake until slightly brown. Piercing the crust with a fork prevents it from warping in the oven.

Filling. — Mix three tablespoons of cornstarch and one cup of sugar. Add one cup of boiling water; mix well and boil five minutes, stirring constantly. Remove from the fire; add one tablespoon of butter, the juice of one lemon, and yolks of two eggs beaten and blended with a tablespoon of the cooked cornstarch mixture. Place the filling in the crust, return to the oven, and bake until the filling boils or bubbles. Beat the whites of two eggs stiff and dry; add four tablespoons of sugar and a few drops of lemon juice. Spread over the pie and bake until the egg is slightly brown.

Pumpkin Pie. — Line a plate with crust and have it extend one half inch above the edge of the plate. Mix one cup of pumpkin, one and one fourth cups of milk, one third cup of sugar, two tablespoons of molasses, two well-beaten eggs, one fourth teaspoon of ginger, one fourth teaspoon of cinnamon. Fill the crust with the filling, and bake thirty-five to forty minutes, or until the filling is firm, like custard.

Rhubarb Pie. — Mix one cup of sugar, two and one fourth tablespoons of flour, and one well-beaten egg. Add two cups of rhubarb cut in small pieces, and mix well. Bake with two crusts as for apple pie.

Cookies

Sugar Cookies. — Cream one half cup of shortening, add one cup of sugar gradually, then add two eggs well beaten, and one half cup of sour milk; add three cups of flour, one fourth teaspoon of soda, one half teaspoon of salt, one fourth teaspoon of nutmeg, sifted together, and one half teaspoon of vanilla. Roll out one fourth inch thick, cut, and bake in a hot oven.

Molasses Cookies, Crisp. — Scald one cup of molasses, remove from the fire, and add one half cup of lard, one half cup of sugar, one teaspoon of ginger, one fourth teaspoon of salt. Let the mixture stand until cool, then add one fourth cup of water. Sift one half teaspoon of soda in about four cups of flour, and add gradually. Roll one eighth inch thick, cut, and bake in a moderate oven.

Molasses Cookies, Soft. — Mix one cup of molasses, three fourths cup of shortening, one cup of boiling water. Place the mixture on the stove, and let it come to the boiling point. Cool slightly; add one egg well beaten, four cups of flour, one half teaspoon of soda, four teaspoons of ginger, two teaspoons of cinnamon, one half teaspoon of cloves, sifted together. Mix thoroughly. Drop by tablespoons, one inch apart, on a greased pan. Bake in a hot oven.

Oatmeal Cookies. — Cream one cup of shortening; gradually add one cup of sugar, then add two eggs well beaten, and four tablespoons of sour milk. Sift together two and

one half cups of flour, one teaspoon of cinnamon, one half teaspoon of soda, one fourth teaspoon of salt, and add gradually. When thoroughly mixed, add one teaspoon of vanilla, two cups of raw oatmeal, and one cup of currants. Roll out one eighth inch thick, cut in squares, and bake in a hot oven.

Chocolate Cookies. — Cream one half cup of shortening, add gradually one cup of sugar, then two ounces of melted chocolate, and one egg well beaten. Mix thoroughly, and add one fourth cup of milk, one teaspoon of vanilla, two and one fourth cups of flour, three teaspoons of baking powder, and one fourth teaspoon of salt, sifted together. Roll out thin, cut, and bake in a moderate oven.

Cakes

All cakes are grouped into two general classes, — those made with butter or some kind of shortening, and those made without shortening, as sponge, angel, or sunshine cakes.

The directions for mixing butter cakes are practically the same for every case. Grease and flour the cake pans, and prepare the oven. Measure all dry ingredients first, and sift the flour, salt, baking powder, or soda, and spices together. Flour raisins or currants, if they are to be used. Beat the eggs, beating the yolks and whites together, unless the directions call for the whites and yolks beaten separately. In that case beat the yolks until smooth and thick, and the whites until they are so dry that the bowl in which they are beaten may be turned upside down without danger of loss of eggs.

When all is in readiness, cream the shortening; this is done by working it against the side of the bowl with the

mixing spoon until it is soft as cream. Add the sugar gradually, and work it into the shortening until it is partially dissolved. Add the beaten eggs and beat the mixture thoroughly so that sugar, shortening, and eggs are perfectly blended. Add the milk and flour alternately so as to keep the same consistency throughout the process.

Cake Making.

Never stir a cake after the eggs are added, because stirring breaks the air bubbles. The cake should be beaten, using long strokes of the spoon and going through the batter to inclose as much air as possible. During baking, watch the oven carefully. If the oven is too hot, the cake will not rise sufficiently. Small cakes demand a hot oven, large cakes a moderate oven, as in the latter case the heat must be slow enough to penetrate to the center of the cake.

A good cake is slightly rounded, smooth, and an even brown all over. If it cracks, it contains too much flour, or

it has baked too fast. The grain should be fine and uniform throughout.

When a cake is baked, it shrinks from the sides of the pan, it is firm on top, when touched with the finger, or, if a clean straw is inserted, it comes out dry.

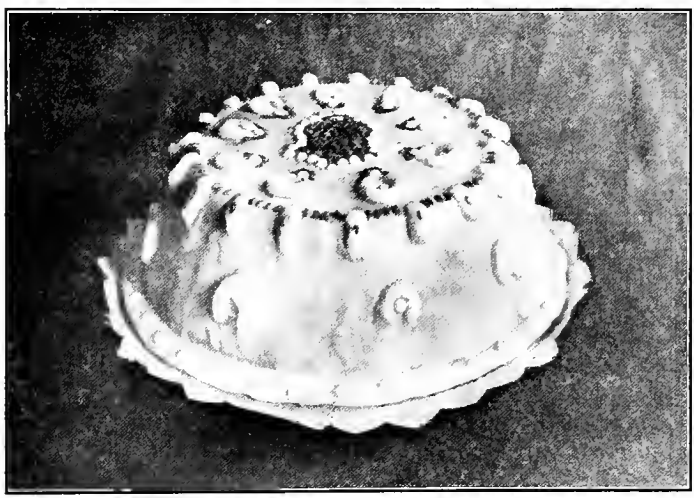
A great variety of cakes may be made from the recipe for Plain Cake by adding spices, nuts, raisins; chocolate or other fillings, and frostings. A cake should never contain more than half as much shortening as sugar. It should contain less than half as much milk as flour. If more than two eggs are used in a cake, less baking powder will be required than for a two-egg cake. Too much baking powder makes a cake dry and crumbly.

Plain Cake. — Cream four tablespoons of butter, or some other shortening; add one cup of sugar, two eggs well beaten, one half cup of milk, and one and one half cups of flour, one fourth teaspoon of salt, three teaspoons of baking powder sifted together, and one half teaspoon of vanilla. Mix according to directions given. Cover with chocolate frosting.

Spice Cake. — Cream one cup of butter; add two cups of brown sugar, and yolks of four eggs; beat well. Add one cup of milk and two and one half cups of flour, one teaspoon of cloves, one teaspoon of nutmeg, one teaspoon of cinnamon, and three teaspoons of baking powder. When thoroughly mixed, carefully add the beaten whites of four eggs, and bake in layers. Put chocolate frosting between the layers and on top.

Chocolate Frosting. — Melt two ounces of chocolate; add one cup of sugar, five tablespoons of milk, yolk of one egg, and mix thoroughly. Boil until it thickens, stirring constantly. Remove from fire, add one teaspoon of vanilla, and stir until thick enough to spread.

White Frosting. — Mix one cup of sugar and five tablespoons of cold water, and boil slowly without stirring. As soon as it begins to boil, add one eighth teaspoon cream of tartar to invert the sugar. Boil until it forms a soft ball when dropped into cold water or until it threads when dropped from a spoon. Beat an egg white until stiff and dry. Gradually pour the sirup over it, stirring constantly so as not to cook the egg in flakes. Add



WHITE FROSTED CAKE, DECORATED.

one half teaspoon of vanilla, and stir until thick enough to spread.

Orange Cake. — Cream five tablespoons of butter; add one cup of sugar, grated rind of one orange, three eggs, one half cup of milk, one and three fourths cups of flour, three teaspoons of baking powder, one fourth teaspoon of salt. Mix as in plain cake. Frost with White Frosting.

The cake may be baked in layers and then cut into squares or diamond shapes and frosted all over.

Nut Cake. — Cream six tablespoons of butter; add one cup of sugar, three eggs, one half cup of milk, one and three fourths cups of flour, two and one half teaspoons of baking powder, one fourth teaspoon of salt, one half teaspoon of vanilla. Lastly add three fourths cup of chopped nut meats. Mix as for Plain Cake.

Spanish Buns. — Cream one half cup of butter; add one and one half cups of sugar, three eggs, one cup of sour milk, two and one half cups of flour, one teaspoon of cinnamon, one teaspoon of cloves, one half teaspoon of soda, and one cup of raisins. Mix as for butter cake. Bake in muffin pans.

Golden Cake. — Cream one half cup of butter; add one cup of sugar, yolks of ten eggs, one and three fourths cups of flour, three teaspoons of baking powder, one fourth teaspoon of salt, one half cup of milk, and one half teaspoon of flavoring. Mix as for Plain Cake. May be baked in muffin pans for small cakes and frosted, or baked as a loaf cake.

Sponge Cake. — Beat the yolks of six eggs until thick; add one cup of sugar gradually, and continue beating with the egg beater. Add one tablespoon of lemon juice or one teaspoon of lemon extract. Beat the whites of six eggs until stiff and dry. Mix the whites and yolks, and when partially mixed cut and fold in one cup of flour and one fourth teaspoon of salt. Bake in an unbuttered pan, in a slow oven, one hour.

Angel Cake. — Beat one and one fourth cup of egg whites until frothy, add one teaspoon of cream tartar and continue beating until the eggs are stiff and dry. Grad-

ually add one and one half cups of rolled and sifted sugar. Sift one cup of flour and one fourth teaspoon of salt four times, and add it to the eggs, being careful not to mix it more than is necessary. Add one teaspoon of vanilla. Bake forty to forty-five minutes in an unbuttered angel cake pan.

Jelly Roll. — Beat three eggs until light, add one half cup of sugar, one half cup of flour, one half teaspoon of baking powder, one eighth teaspoon of salt, and one half teaspoon of vanilla. Beat well. Bake in a slow oven in a pan the bottom of which is lined with greased paper. When baked, turn bottom side up on a paper sprinkled with powdered sugar. Remove the paper from the bottom of the cake. Spread the cake with jelly and roll.

Chocolate Cake. — Cream six tablespoons of butter, add one cup of sugar and mix thoroughly, add two ounces of melted chocolate and two eggs well beaten. Add, alternately, two thirds of a cup of milk and one and one half cups of flour, three teaspoons of baking powder, and one fourth teaspoon of salt sifted together. Add one half teaspoon of vanilla. Bake in a moderate oven, in a shallow pan, about thirty-five minutes. Frost with chocolate frosting.

Crispettes. — Beat two eggs thoroughly, add one cup of brown sugar, sifted with six tablespoons of flour and one eighth teaspoon of salt. Beat thoroughly. Add one cup of chopped nuts. Drop by spoonfuls, about three inches apart, on greased paper, and bake in a hot oven.

CHAPTER IX

LEGUMES AND FRYING LESSONS

LEGUMES

Peas, beans, lentils, and peanuts belong to the family called legumes. These growing plants have little nodules at their roots, which contain bacteria that have the power to take nitrogen from the air and put it in a form available for food for man and animals.

Nitrogen occurs in protein foods only, and proteins are, generally speaking, the most expensive and the most important foods. Legumes are a cheap food, and they contain so much protein that they rank with meat, fish, cheese, and eggs as tissue-building foods.

Legumes should be classed in two distinct classes: the fresh form, such as string beans, green peas, and fresh lima beans; and the dried beans and peas. Those in the first class rank little higher than green vegetables in nutritive value, because they are picked long before the seeds have reached maturity. The dried forms have been allowed to ripen until the seeds have stored enough nutrition to nourish the germ of the new plant when it begins to sprout. For use as a food they are then thoroughly dried and may be kept for an indefinite period of time. When they are to be used, they must be soaked in cold water for several hours or overnight to restore some of the moisture.

Dried legumes contain from 18–25 per cent protein; from 59–66 per cent carbohydrate in the form of starch and

cellulose, the cellulose reaching as high as $4\frac{1}{2}$ per cent in dried peas. With the exception of peanuts they contain scarcely any fat, and must be served with butter or cooked with pork for flavor and to make them a better balanced food.

The legumes require long, slow cooking because the starch and protein are stored in cells surrounded by thick walls of cellulose, and it requires long cooking to soften the walls and free the starch and protein. One reason why the process is so long is because beans and peas are ordinarily cooked whole, and, as they are compact, only long, slow cooking will soften them. If the skin were removed and the legumes ground into a powder, the cooking process could be shortened.

Legumes are a cheap, wholesome, and highly nutritious food, and should often serve as a substitute for meat in the diet. A portion of lentil, pea, or bean soup served with bread or crackers forms a perfectly balanced meal and has the advantage of being an economical one. Too little attention is paid to the methods of preparing and serving the legumes, for they should be considered important foods, and they are almost universally liked.

Boston Baked Beans. — Wash one quart of navy beans, cover with cold water, and let them soak over night. Drain off the water, cover with fresh boiling water, and let them cook slowly until the skins begin to burst. Add one teaspoon of soda, stir well, and boil for two minutes. Drain off the water and rinse the beans well with fresh boiling water. Cut one half pound of fat salt pork in one half inch slices. Mix one tablespoon of mustard, one tablespoon of salt, two tablespoons of molasses, two tablespoons of sugar, with one cup of boiling water. Place beans in the bean pot,

distribute the pieces of pork through the pot, pour the liquid over the beans, add enough boiling water to completely cover the beans, put on the cover, place pot in a slow oven and cook from six to eight hours. Add water so that the beans are kept covered with it. Cook uncovered during the last hour. Beans may be started in the fireless cooker and cooked overnight. They should be placed in the oven about four hours before they are to be used, and cooked slowly. Some cooking in the oven is necessary to bring out the flavor. If the fireless cooker has a soapstone plate, oven cooking is not necessary.

Lima Beans. — Soak one pint of lima beans over night. Cover with salted boiling water, and cook slowly until soft. Add only enough water to prevent burning; season with salt, pepper, and butter.

Salted Peanuts. — Remove shells and skins from raw peanuts. Put lard, butter, or olive oil, preferably the latter, in a pan on the stove. When melted, add peanuts and stir constantly so that they will brown on both sides. Remove from fat and drain on soft paper; sprinkle with salt. Olive oil or lard is better than butter, because butter burns so readily.

Lentil Soup. — Wash one cup of lentils, cover with cold water, and soak over night. Drain; cook in two quarts of water until soft (about two hours); add one bay leaf, one half teaspoon of salt, one fourth teaspoon pepper. Press through a colander and sieve. Add two tablespoons of flour, two tablespoons of butter, one grated onion, prepared as for White Sauce. Boil three minutes.

Succotash. — Soak lima beans or red kidney beans over night. Cook until soft (about two hours); ten minutes before they are ready to serve, add one can of corn, season

with three tablespoons of butter, one half teaspoon of salt, one eighth teaspoon of pepper. Stir constantly. During the summer season when green corn is plentiful and beans are fresh, succotash may be prepared from lima or kidney beans and corn cut from the cob. Follow directions given above.

NOTE. — In the lessons on legumes, much time is consumed in the long slow cooking, during which there is but little work to be done in class. For this reason the frying lessons are added, and one may be given with each lesson on legumes. For Rules for Frying, see page 46.

FRYING LESSONS

Doughnuts. — Mix one cup sour milk with one cup sugar, and let stand for 5 or 10 minutes. Add two eggs well beaten; add one cup flour, one fourth teaspoon salt, one half teaspoon soda, one fourth teaspoon nutmeg, sifted together; add three tablespoons melted butter and one half teaspoon vanilla, and beat until smooth. Add enough more flour to make a soft dough. Roll out one half inch thick, cut with a doughnut cutter, and fry in deep fat.

Fritters. — Mix and sift together one and one half cups flour, one fourth teaspoon salt, three teaspoons baking powder. Add three fourths cup milk and one egg well beaten. Beat very light. Drop slices of tart apple one fourth inch thick into the batter, and stir until the batter covers the apple. Drop the pieces of apple into hot fat, and fry until brown.

Croquettes. Meat or Fish. — Melt three tablespoons butter; add one third cup flour and rub together until blended. Add one cup milk and cook until thick. Add one teaspoon chopped onion, one teaspoon salt, one eighth teaspoon pepper, and two cups cold chopped meat or flaked

fish. Mix thoroughly and cool. Shape into cones or balls, dip in beaten eggs, roll in grated bread or cracker crumbs, and fry in deep fat.

Corn Fritters. — Mix and sift together one cup flour, two teaspoons baking powder, one half teaspoon salt, one fourth teaspoon pepper. Add two eggs well beaten, one third cup milk. Beat until smooth; add one half cup canned corn. Drop by spoonfuls in deep fat, and fry.

Corn Oysters. — Beat two eggs until light; add one can corn, two tablespoons melted butter, and one half cup flour, one teaspoon baking powder and one fourth teaspoon salt sifted together. Mix well. Drop spoonfuls on hot griddle or frying pan, and fry as for griddle cakes.

Bacon and Corn. — Cut one half pound of bacon in inch pieces, fry until brown. Turn off nearly all of the fat from the frying pan. Add one can of corn and cook five minutes, stirring constantly. Season with one teaspoon of salt and one eighth teaspoon of pepper and serve immediately.

CHAPTER X

EGGS. PLANNING A LUNCHEON

Eggs rank with meat and fish as important tissue-building foods. They are more nutritious than meat because they contain more kinds of protein and more mineral matter, and for this reason and because they are easily digested, they are served to the sick and convalescing so that they may gain strength and weight.

Eggs when freed from the shell contain 73.7 per cent water, 14.8 per cent protein, 10.5 per cent fat, and 1 per cent mineral matter. Because of the high percentage of protein, they should be eaten with carbohydrate foods. Eggs are valuable foods in themselves, but no other food except flour has so many uses in cooking.

Experiments.

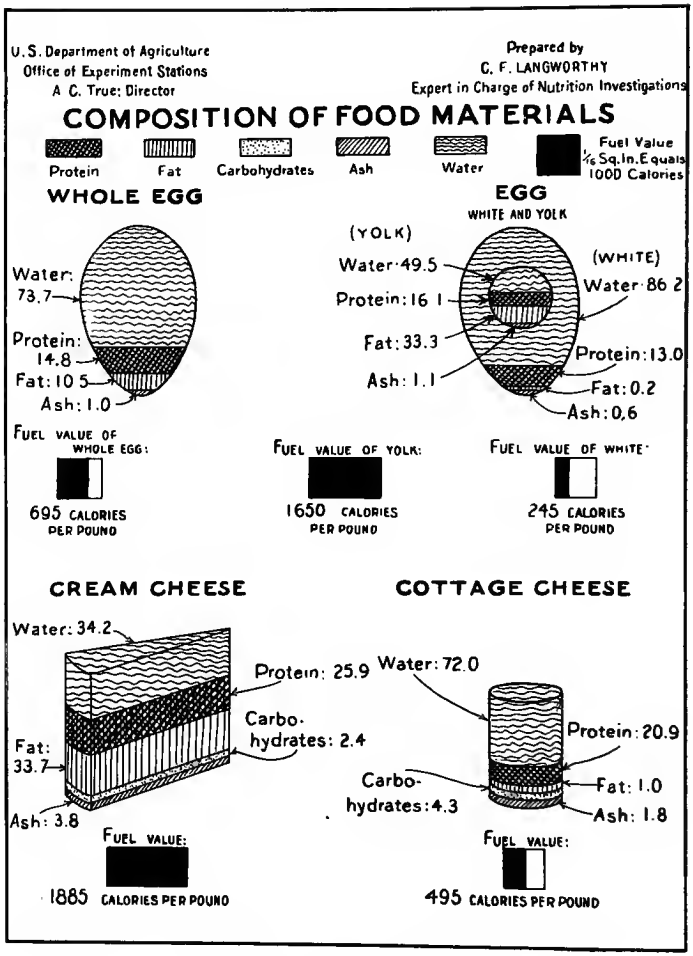
For Freshness. — Roll a piece of paper until it is the diameter of an egg. Put the egg in one end. Hold the other end to the eye and face the light. If the egg looks clear, it is fresh; if cloudy, it is stale.

Place the egg in cold water. If it sinks, it is fresh.

For Kind of Protein. — Note the effect of cold water on the white. Albumin is soluble in cold water.

Bring the water to a boiling point, and note the effect on the albumin. Heat coagulates albumin.

Boil an egg and let it stand thirty minutes. Separate the white and yolk; note the dark color on the outside of the yolk. What mineral present?



COMPOSITION OF EGGS AND CHEESE.

USES OF EGGS

1. Eggs are a tissue-building food and serve as a substitute for meat. They are easily digested, easily prepared and served, and are almost universally liked.

2. Eggs have many uses in cooking. Foods are dipped in egg before they are fried because the heat coagulates the albumin in the egg, and it forms a crust over the food so that juices and flavor are retained and the fat is prevented from soaking into the food.

3. Eggs are blended with a liquid such as milk, and the whole mass is thickened and becomes smooth and velvety, as in the making of custards.

4. Eggs hold particles of flour together so that hollow shells are formed, as in the making of popovers.

5. When the yolks and whites are beaten separately, eggs make foods light and fluffy, as in the making of omelet and sponge cake.

6. Eggs are used as a garnish for foods, as salads, soups, etc.

7. Eggs are used to clear or clarify, as in coffee making and the clearing of soups.

When eggs are used to hold particles of flour together, or as a thickening agent, or to form a crust over foods, they should not be beaten, but the yolk and white should be well blended. When they are used to make foods light, as in cake making, omelets, etc., they should be beaten so as to inclose as much air as possible. It is the expansion of the inclosed air and then the hardening of the protein wall that makes the cake light. As the albumin in egg coagulates at about 160° F., and as stronger heat tends to make the mixture tough, all egg dishes should be cooked at as low a temperature as possible.

Baked Cup Custard. — Beat two large or three small eggs slightly with a fork, just enough to blend the yolks and whites. Add four tablespoons of sugar, a speck of salt, one pint of milk, and one half teaspoon of vanilla. Mix well and turn into custard cups, then grate nutmeg over the top. Set the cups in a pan of boiling water, set the pan in the oven, and bake the custard at a moderate temperature until it is firm. Test with a knife. If, after the knife is inserted, it comes out clean, the custard is done. If the knife is coated with milk, the custard has not thickened sufficiently.

Baked Caramel Custard. — Melt one half cup of sugar to a sirup, stirring constantly to prevent burning. When the sugar is a light brown sirup, gradually add two cups of milk, and stir until the sugar is melted. Add three eggs slightly beaten, one fourth teaspoon salt, one half teaspoon vanilla. Bake as for Cup Custard.

Soft Custard. — Beat two eggs enough to blend yolk and white; add six tablespoons of sugar, a speck of salt, two cups of milk, and flavor with nutmeg. Cook in a double boiler, stirring constantly, until the custard coats the spoon. Add one teaspoon of vanilla. If the custard is cooked too long, it will curdle. It must be removed from the fire as soon as it begins to thicken. Serve cold.

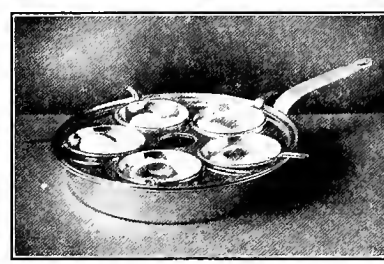
Boiled Eggs. — Pour boiling water into a stewpan and place it over the fire and make sure that the water is actually boiling. Put eggs into the water, and let them remain over the fire for a few *seconds*. Cover the stewpan and place it where the water will not lose too much heat, but where it will not boil, — for 6 to 8 minutes for a "soft-boiled egg," or 20 to 30 minutes for "hard-boiled." Eggs may be placed in cold water and brought to the boiling point. When the

water boils, the eggs are "soft-boiled." They may be boiled five minutes longer for a hard-boiled egg.

Scrambled Eggs. — Beat six eggs slightly, until whites and yolks are blended; add one half cup of milk or water, and one fourth teaspoon of salt. Put two tablespoons of butter into the omelet pan, and heat until the butter is melted. Turn in the egg mixture, and cook at a low temperature until creamy, scraping the cooked portion from the side of the pan so the uncooked part will reach the bottom. Remove from the pan, and serve immediately. Chopped ham or bacon or cheese may be added to scrambled eggs just before they are removed from the pan.

Omelet. — (See p. 98.)

Poached Eggs. — Have a frying pan half full of boiling water, and add one half teaspoon of salt. Break the eggs, one at a time, into a cup, and carefully slip them into the water. Let them remain in the water until cooked as desired. Lift them out carefully with a skimmer, and serve on buttered toast. A pan, specially devised for poaching eggs, is shown in the illustration.



POACHED EGGS.

French Toast. — Beat two eggs until yolks and whites are blended; add one half cup of milk, two tablespoons of sugar, one fourth teaspoon of salt. Mix well and turn into a shallow pan. Dip slices of bread into the mixture, and fry on one side as for pancakes until brown; turn and brown the other side.

Deviled Eggs. — Cook eggs until hard boiled. Pour cold water over to cool rapidly and prevent discoloring. Remove the shells and cut in halves crosswise. Remove the yolks and mash them with a fork. For four eggs mix one fourth teaspoon of mustard, one fourth teaspoon of salt, one eighth teaspoon of pepper, with two teaspoons of melted butter. Add the yolks, and mix well. Fill the whites with the mixture.

Bacon and Fried Eggs. — Cook bacon until crisp, remove from the frying pan, and turn the eggs one at a time into the hot fat. When the whites are firm and the yolks coated with a film, remove the eggs carefully, and serve at once. Eggs are sometimes turned and fried on both sides, but they should not be fried brown, because that indicates that they are cooked at too high a temperature. Eggs are frequently fried with ham in the same manner as with bacon.

A Luncheon Table.

PLANNING AND SERVING A LUNCHEON

Pupils have had enough variety in foods so that they are prepared to plan and serve a luncheon, following the plan suggested for serving breakfasts.

LUNCHEON MAY CONSIST OF THE FOLLOWING COURSES: —

1. A Cheese Dish	1. Salad or Cream Soup
2. Potato Bread	2. Potato Bread
3. Sauce Cake Beverage	3. Sauce Cake Beverage

SUGGESTED MENUS

1

Macaroni and Cheese
Potato Chips Bread
Berries Chocolate Cake
Tea

2

Cream of Pea Soup
Croutons Bread
Baked Apples and Cream Gingerbread
Tea

3

Deviled Eggs Creamed Potatoes
Muffins
Stewed Apricots Rocks
Cocoa

CHAPTER XI

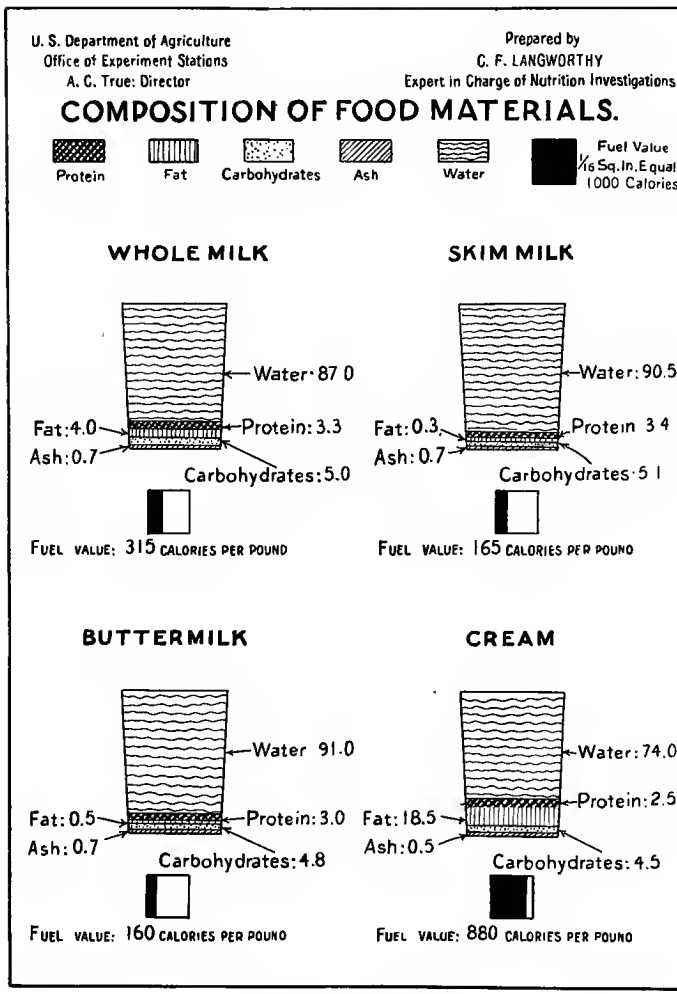
MILK AND ITS PRODUCTS

MILK

MILK contains 87 per cent water, 3.3 per cent protein, 4 per cent fat, 5 per cent carbohydrates, .7 per cent mineral matter. It is a perfect food for the young calf, because it contains all the elements needed for its nourishment up to a certain stage of its growth. The milk of all animals differs slightly in composition, so the milk of one mammal is not a perfect food for others. Cow's milk must have the protein diluted, and sugar added, to make it a perfect food for the human infant.

Milk is not a perfect food for an adult because it contains too much water, not enough carbohydrate in proportion to its protein, and no cellulose or waste matter. It must be eaten with bulky foods.

The most important constituent in milk is protein. The protein is in the form of albumin, casein, and compound proteins. Heat coagulates the albumin, and it comes to the top of boiled milk in the form of a thin skin. The casein is not coagulated by heat, but by the ferment rennin, and it is precipitated by the presence of lactic acid during the souring of milk. The fat occurs in minute globules. When milk stands for a time, these globules rise to the surface and form cream. Each globule is surrounded by an albuminous covering, and when the cream is churned the cover-



COMPOSITION OF MILK.

ing is broken, and the fat and protein separate. The fat is called butter and the remainder buttermilk. Buttermilk contains 91 per cent water, 3 per cent protein, .5 per cent fat, 4.8 per cent carbohydrate, .7 per cent mineral matter, and is a very digestible protein food. Butter is the most easily digested form of fat known. The sugar in milk is called lactose. It is added to cow's milk for infant feeding, as it does not ferment as readily as does cane sugar.

Experiments with Milk to find Composition.

1. Boil some milk. The skin which rises to the surface is albumin. It is like white of egg, and like the substance that rises to the surface of water when potatoes are boiled; also like the brown scum which forms when meat is boiled.

2. Add rennet to lukewarm milk. Casein is coagulated. Stir with a spoon, and the casein, entangling the fat, separates from the whey. The whey contains most of the sugar and mineral matter.

Add acid, as vinegar or lemon juice to milk, or allow it to sour. The casein is precipitated by the presence of the acid.

3. Test a sample of milk for starch with solution of iodine.

4. Drop milk on paper, and note the presence of fat.

5. Slowly turn out the contents from a bottle of milk, and note whether there is dirt or sediment in the bottom, or in the last portion of milk. If so, it shows that the milk is insanitary and not fit to use. This condition should be reported to the State Dairy and Food Inspector.

Pasteurized Milk for Infant Feeding. — Sterilize the bottle by boiling it for ten minutes as you would sterilize fruit jars. Fill the bottle nearly full with milk, and place the cap on the bottle or close with a wad of absorbent cotton. Place the bottle in a deep pan which contains a small rack or board so that the bottom of the bottle will not come in contact with the bottom of the pan. Fill the pan with cold water so that the water comes as high as

the milk in the bottle. Heat the water to 158° F., remove to the back of the stove, cover the pan, and keep it at that temperature for twenty minutes. Cool milk quickly and keep in a cool place until ready to use. If it is to be used for infant feeding, it must be heated to lukewarm temperature just before it is used.

Cottage Cheese. — Heat sour milk to a temperature of about 98° F. and let stand until it is uniformly warm throughout and the curd separates from the whey. Drain the whey off; add melted butter or cream, salt, pepper, and serve while fresh. It may be flavored with pimentoes, chopped olives, or chopped nuts. The curd and whey may be separated by pouring boiling water over the milk.

PASTEURIZING MILK.
(From Hunter's *Civic Biology*.)

Junket. — Use one rennet tablet dissolved in one tablespoon of cold water. Heat one quart of milk to a temperature of 98° F.; add four tablespoons sugar and one teaspoon of vanilla; add the dissolved rennet and let it stand in a warm place until it thickens. Cool and serve with a sprinkling of cinnamon or nutmeg or whipped cream.

Milk Soups or Cream Soups. — Milk soups are White Sauce and the pulp of some vegetable that has been

thoroughly cooked and pressed through a strainer so as to rid it of seeds, skins, and any coarse particles. The vegetables most commonly used for soups are potatoes, tomatoes, celery, corn, peas, beans, and asparagus.

Milk soups are very nutritious; in fact, one half recipe of potato or lentil soup and one or two ounces of bread form a balanced meal for lunch or supper. Milk soups should not be served at dinner, as they contain too much nutrition to be served with a heavy meal. They may form the main dish at lunch or supper. All milk soups may be made after the following directions.

Cook the vegetables until soft enough to be put through a strainer. If the vegetables contain acid, as in tomato, add soda to neutralize it before adding milk. Melt the butter, add the flour, and rub them together thoroughly. Add the vegetable pulp and cook until the mixture thickens; then add milk and seasoning, cook for a minute or two, and then serve. Or, add milk to butter and flour, as for White Sauce, cook until it thickens, add seasoning, and then add vegetable pulp and cook for two minutes.

Cream of Tomato Soup. — Cook two cups of canned tomatoes with two teaspoons of sugar for five minutes. Add one fourth teaspoon of soda and stir well, then add one fourth teaspoon of salt and rub the mixture through a sieve. Melt four tablespoons of butter, add four tablespoons of flour, and rub together until thoroughly mixed. Add two quarts of milk and one slice of onion. Cook until the mixture thickens. Remove the onion. Add the tomato pulp to the milk, and cook one minute. Serve.

Cream of Pea Soup. — Cook one can of Marrowfat peas in three cups of water for ten minutes. Add one slice of onion and two teaspoons of sugar. Rub the mixture

through a sieve until nothing remains in the sieve but the skins of the peas. Melt four tablespoons of butter, add two tablespoons of flour, and rub together until thoroughly mixed. Add two cups of milk, and cook until it thickens, then add one teaspoon of salt, one eighth teaspoon pepper. Add the peas and cook three minutes. Serve.

Corn Chowder. — Cook one slice of bacon, or salt pork, cut in small pieces, until crisp or brown. Add one slice of onion, cut in small pieces, and fry until brown. Parboil three cups of thinly sliced potatoes for ten minutes, drain, and add the potatoes to the bacon and onion. Add one can of corn, one quart of milk, two tablespoons of butter, one half teaspoon of salt, and one eighth teaspoon of pepper. Cook five minutes. Add half a dozen crackers, and serve.

Garnish for Soups.

Chopped Parsley	Macaroni
Chopped Celery Tips	Vermicelli
Chopped White of Egg	Spaghetti
Whipped Cream	Pearl Barley
Diced Potatoes	Rice
Riced Eggs	Noodles

To Serve with Soup.

Wafers	Bread Sticks
Crackers	Croutons

CHEESE

Cheese ranks first among tissue-building foods because it contains a higher percentage of protein than any other food. American cheese, the kind most commonly purchased, contains 27.4 per cent water, 27.7 per cent protein, 36.8 per cent fat, 4.1 per cent carbohydrate, and 4 per

cent mineral matter, which is mainly common salt that has been added in the process of cheese making.

Cheese is a concentrated food; that is, it contains no cellulose and a small amount of water, and for this reason some people find it hard to digest. If it is grated or finely divided and mixed with other foods that will increase the amount of carbohydrate and bulk, it forms a cheap and valuable protein food and is a good substitute for meat.

A great many varieties of cheese are made. Some contain more water than others; some are made from milk, some from milk to which cream has been added, and some are made from skim milk. Some derive their flavor and odor from the peculiar fermentation that takes place during ripening.

Cheese is made the same way that junket is made. The milk is heated to lukewarm temperature, and rennet is added, and it is allowed to coagulate. The curd is then cut so that the whey can be removed, and this water is drawn off. Then the curd is pressed into shape and allowed to cure or ripen. The process of ripening brings out the flavor of the cheese. All American cheese is colored with a harmless vegetable coloring.

Cheese Fondu. — Thoroughly mix one fourth cup crumbs, one fourth pound of grated cheese, one fourth teaspoon salt, speck cayenne pepper, one cup milk, one tablespoon melted butter, and three eggs. Bake in individual dishes. Serve immediately.

Welsh Rarebit. — Mix together one pound of cheese cut in small pieces or chopped, one teaspoon butter, one teaspoon salt and speck of paprika, one teaspoon mustard mixed with one teaspoon of cream, and heat slowly. When the cheese is nearly melted, add one beaten egg. Stir well,

and when all the cheese is melted, add one fourth cup of cream or more, until it is the desired thickness. Serve immediately on wafers or toast.

Cheese Straws. (a) — One cup flour, one fourth teaspoon salt, five tablespoons lard. Mix as for pie crust, and roll out thin. Cut into two equal pieces. Sprinkle one piece with grated cheese, season with salt and paprika, and a small amount of melted butter. Place the other piece over this, press them together, and then cut into strips about one half inch wide and three inches long. Bake in a hot oven until crisp and brown. Serve with salad.

Cheese Straws. (b) — One half cup flour, three fourths cup bread crumbs, one cup grated or chopped cheese, one tablespoon melted butter, one fourth teaspoon salt, speck of paprika, one half cup milk. Rub butter and flour together; add crumbs, seasoning, cheese, and milk, and mix thoroughly. Roll out one fourth inch thick and cut in pieces one half inch wide and three inches long. Bake until brown in a moderate oven.

Cheese Souffle. — Two tablespoons melted butter, two tablespoons flour, one cup milk, one fourth teaspoon salt, speck paprika, three fourths cup cheese, four eggs, white and yolk beaten separately. Add flour to melted butter and rub together thoroughly. Add milk and seasoning and cook until it begins to thicken. Add beaten yolks and cheese; mix thoroughly. When it has cooled slightly, add whites of eggs beaten stiff and dry, and bake in a moderate oven until brown, — about thirty minutes. Serve immediately.

Juno Salad: — Mix one Neufchatel cheese, one half cup chopped walnuts, one fourth cup chopped pimentoes. Moisten with Cooked Salad Dressing and arrange on lettuce.

CHAPTER XII

MEATS AND FISH

MEATS

ALL meats, including poultry and game, are similar in composition and structure, and the same methods of cooking may be applied to all. The different meats and cuts of the same meat vary in flavor; in the amount of bone, refuse, and fat which they contain; and some are more extensively used than others.

The edible portion of meat is mainly protein, and it furnishes about one third of the tissue-building food consumed by the American people. Proteins are the important food substances in meat, and to understand the cooking of them, it is necessary to know the kinds found; where they occur; and the effect of heat on flavor, digestibility, and palatability.

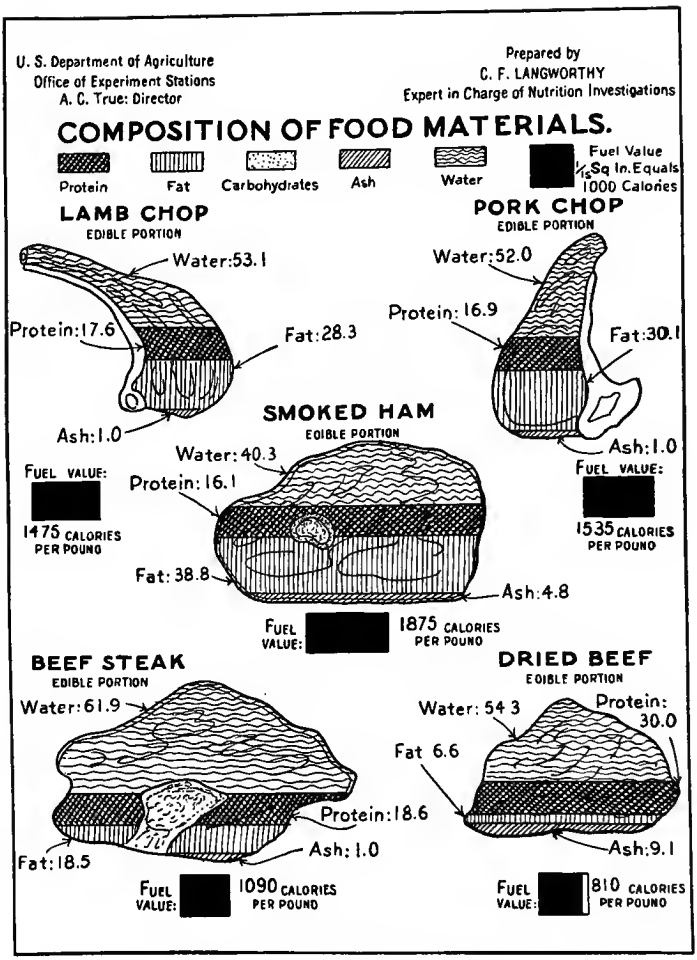
Meat consists of bone, fat, and muscle fiber. The bone is about one half solids and one half water. The solid part consists of mineral matter, fat, and ossein. The ossein is not a true protein, but an albuminoid which is dissolved by long boiling and gelatinizes when cooled. It is not a tissue-building food, but has come to be called a protein sparer. Bone is used in soup making to furnish the gelatin and some of the fat. It is generally thought that if the bone is left in cuts of meat during cooking, the flavor is improved.

Fat differs in different animals. The fat of the hog is softer and less highly flavored than that of other animals, and, because of this, and because it has a high burning point, it is extensively used for frying foods. Beef and mutton fats contain more stearin than pork fat; they are harder, more highly flavored, and not used much in cooking. It could be said that fats are not consumed, to any great extent, as meat, but are separated from the muscle fiber and prepared for use in some other way. The only exception to this is the use of pork as bacon, salt pork, and sausage, but even then much of the fat is lost in cooking.

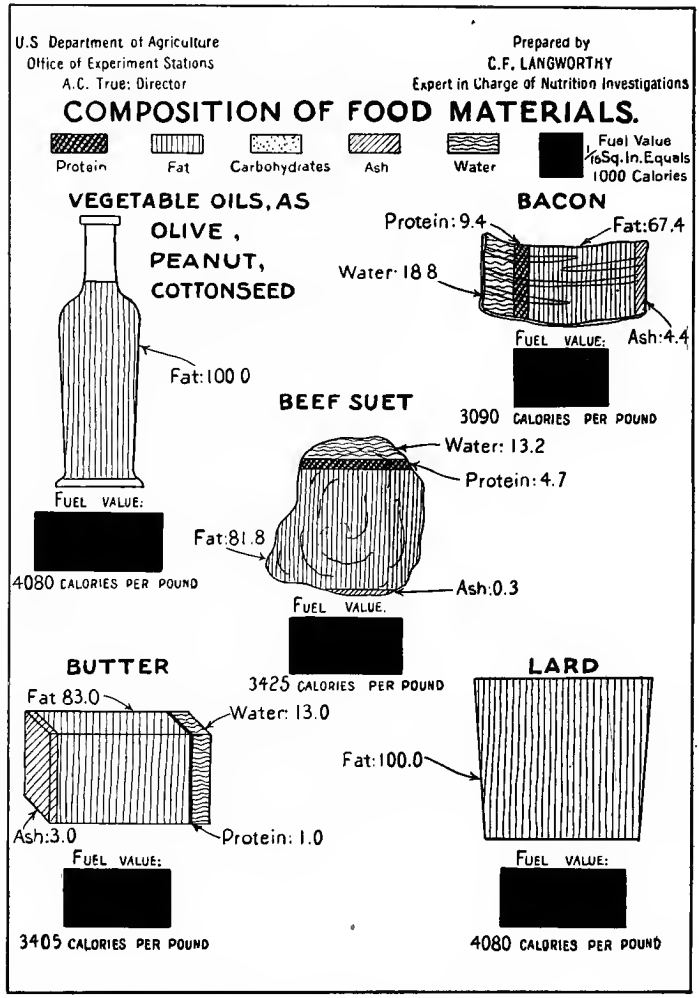
The most important part of meat, then, is the muscle fiber, and if it is examined closely it will be found to consist of bundles of tubes or fibers held together by a substance similar to the ossein in bone, called collagen, a form of connective tissue. As this substance, collagen, is a form of albuminoid, it is softened and dissolved by moist heat.

The tubes contain various proteins, — albumin, fibrin, myosin, compound proteins, and extractives, — and it is this part of the meat which furnishes the tissue-building material for the body. The muscle tubes consist of a substance called elastin, another albuminoid.

The toughness or tenderness of a cut of meat depends on the thickness of the albuminoids which form the cell walls and which hold the cells together. If the cut of meat is from a part of the animal where the muscles have been exercised a great deal, the albuminoids are thicker and tougher than in those parts which are exercised but little. Hence the meat will be tougher and will require long, slow cooking to soften the elastin and collagen. That is the reason why cuts of meat from the neck and leg are tougher than those from the back.



COMPOSITION OF MEATS.



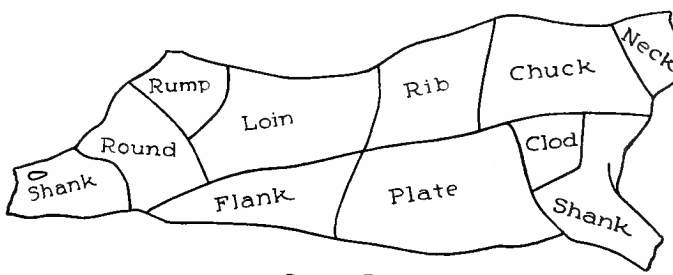
COMPOSITION OF FATS.

The true proteins in meat are coagulated by heat, and flavor is developed. Albumins are soluble in cold water, myosin and fibrin in dilute salt, or alkaline solution, and the rest are insoluble. If meat is soaked in cold water, or put on to cook in cold water, and gradually heated, albumin is dissolved out. It forms the brown scum that rises to the surface of the water when meat is boiled, and is usually lost during the process. Fibrin and myosin are dissolved when meat is soaked in salt solution, as in the corning of beef.

Description of Cuts of Meat

Beef is the meat most extensively used, and if one knows the various cuts of beef and their uses and how to select good beef, he will easily learn the cuts in other animals.

In good beef the best cuts are fine grained, well mottled with fat and lean, and bright red in color after being ex-



Cuts of Beef.

posed to the air. If there is a thick layer of firm, light-colored fat over the loin and rib cuts, the flesh will be juicier and better flavored than when there is little or no fat over these cuts. In the latter case, what fat there is is dark

colored, and the meat is tough and dry. The animal is old, underfed, or losing flesh.

The loin and rib cuts are finer grained and more tender than the other cuts, and require less cooking. They are the finest cuts for steaks and roasts. The other cuts are not so tender, but are juicier, and some of them contain less bone than the finer cuts and when properly cooked are as well flavored and equal to the loin and rib cuts in palatability.

The less tender cuts require long, slow cooking to soften the connective tissue, and for this reason do not make the finest steaks and roasts. As less than twenty-five per cent of the beef is contained in the loin and rib cuts, they sell for a much higher price than round, chuck, or any of the other cuts, because the profit must come from the finer cuts. Many people who cannot afford it buy these expensive cuts because they do not know how to cook the other parts and make them attractive and appetizing. The cheaper cuts are just as nutritious as the others, and when properly cooked are deliciously flavored and more satisfying than the badly cooked steak or dry roast.

After beef is dressed, it is cut into halves. The halves are divided into hind and fore quarters by cutting between the twelfth and thirteenth ribs, leaving one rib in the hind quarter. The flank is cut from the hind quarter, leaving the loin, rump, round, and shank. The loin includes the porterhouse, sirloin, and tenderloin cuts.

The fore quarter is cut across the ribs. The lower part includes the plate, clod, and shank. The upper part includes the rib, chuck, and neck.

Cuts Arranged according to Market Value and Desirability, Highest Priced First

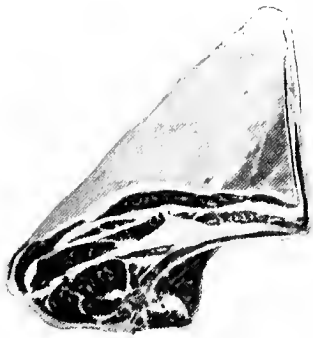
Loin. — This cut includes short steaks, porterhouse, sirloin, and tenderloin. The tenderloin is a long muscle that may be stripped from beneath the loin, but when it is removed, it destroys the value of the porterhouse steak. The first few cuts from the loin are called short or club steaks because they contain no tenderloin. Steaks cut from the beginning of the tenderloin to the beginning of the hook bone are called porterhouse. They are the choicest and highest-priced cuts in beef. The remaining cuts in the loin are the sirloin.

The tenderloin, when sold separately, is deficient in fat, and hence must be larded and then roasted or broiled. The loin is cut into steaks and broiled, occasionally sold as roasts, though expensive, and no finer for roasting than are the ribs.

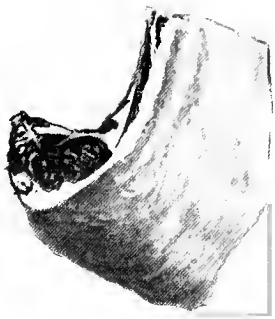
Rib. — This cut consists of seven ribs, called prime ribs; the cut is made close to the shoulder blade and separates it from the chuck. It is sold as roasts, being cut into one, two, or three rib pieces. One rib piece usually weighs about four pounds. The ribs are removed and the piece rolled and called a rolled roast. If the ribs are left in, it is called a standing roast. Dealers sometimes remove the ribs from the cut and sell it as steaks, called small steaks.

Round. — This cut consists of very juicy, lean muscle and but little bone. It is sold as steaks, roasts, and for beef tea and beef juice. It is excellent for pot roast, stews, braizing or casserole of beef, and for beef loaf.

Rump. — This cut contains the end of the hip bone and joint. There is considerable bone, but the remainder



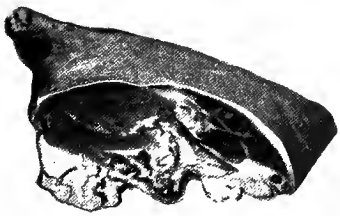
RIB.



RIB.

LOIN.

RUMP.



ROUND.

CHUCK.

CUTS OF BEEF.

(From Conley's *Nutrition and Diet.*)

makes very good steaks and roasts. It is also excellent for pot roast, boiling, braizing, stews, and mincemeat.

Chuck. — This cut is next to the prime ribs cut and similar to it, but contains more bone and gristle and is not so tender. It makes a very good, though large, roast and is sold sometimes as steaks, and by some preferred to the round, because it is mottled with fat. It is excellent for stews, pot roast, boiling, braizing, and mincemeat.

Clod. — This cut is back of the brisket and below the chuck. It is sold for boiling, stews, braizing, and mincemeat.

Flank. — This cut comes from below the loin. It is boneless and coarse, but of good flavor. Flank steak is sometimes cut from the lean muscle on the inside of the flank. This steak may be scored across the grain and broiled. It is also rolled and braized. Flank cut is used for stews, boiling, and rolled and corned.

Neck. — This cut contains juicy, tough meat. It is used in stews, soup, and Hamburg steaks.

Plate. — This cut comes from below the ribs. It has layers of fat and lean and the ends of the ribs. It is used for boiling and corning.

Shank. — These cuts are the fore and hind legs. They are tough, and contain bone and tendons. They are used for soup, cheap stews, and mince meat.

Principles Involved in the Cooking of Meat

But three principles are involved in the cooking of all meats, and a statement of these principles is made before recipes are given which apply them.

I. Tender cuts of meat are broiled, fried, or roasted. The meat is first subjected to strong heat which coagulates

the albumin, and this forms a crust which retains the juices in the meat. If the cut is thick enough, the meat will then cook in its own juices, and if this cooking is continued long enough, it will soften the connective tissue also. If the cut is thin, dry heat will harden the connective tissue. Strong heat is needed at first, to form the crust and to develop flavor, but the heat should be reduced somewhat after this is accomplished or the meat will cook at too high a temperature and be dry and tasteless. This method of cooking should not be applied to tough cuts of meat, because it does not soften the tough connective tissue.

II. Tougher cuts of meat are boiled, stewed, or cooked by some method that combines the stewing and roasting. Meat is cooked in either a large or small quantity of water, at a temperature of 170°–180° F. for several hours. This long, slow cooking in water softens the elastin and collagen, forms of connective tissue which occur in muscle fiber, and coagulates the proteins, and this method of cooking makes tough meat tender. The meat should be started in boiling water, but after the first fifteen minutes the heat should be reduced, and the meat allowed to cook slowly. Low heat softens the connective tissue, while boiling dissolves it and leaves a stringy mass of fibers.

Sometimes the first method and second are combined, and meat is subjected to strong heat at first to sear over the outside and develop flavor, and then the meat is stewed.

III. Very tough cuts of meat are used for soup making because they are apt to be juicy, and it is more economical to use cheap cuts for this purpose. Meat is placed in cold water and allowed to stand; the cold water draws out the soluble albumins, extractives, and other soluble compounds. The meat is then slowly heated to about 160° F. and al-

lowed to cook for several hours. The slow cooking dissolves some of the albuminoids and fat. The longer it is cooked, the more gelatin and fat are obtained. Soup contains soluble albumin, extractives, blood which contains hemoglobin, also gelatin and fat, — these form a very small percentage of the nutrients in meat. The nutritive value of meat soup is in the substances added to it. A soup usually stimulates the appetite.

Experiments with Meat.

I. Scrape a piece of round steak until you can remove no more pulp. The white substance which remains is connective tissue. The pulp contains all the proteins in the meat. It is used to make beef sandwiches for invalids, and is sometimes fed to children from eighteen months to two years old to furnish protein.

II. Cut round steak in small pieces and soak in cold water. Note color of the water. Heat the meat slowly, and press out the juice. This is called beef juice and is used for invalids and for infants from one year to eighteen months old. It is usually made by adding very little water. It contains albumin, coloring matter, and extractives.

III. To show that albumin is present, heat the juice to nearly boiling, 180° F., and note the brown scum. How would you know that extractives are present?

IV. Soak meat over night in salt water. Note change in color and the presence of dissolved myosin and fibrin.

V. Pour boiling water over lean round steak, and boil ten minutes. Note appearance of water, to find whether albumin is present. Taste it to find flavor.

Cooking of Tender Cuts — Principle One

Roast Beef. *Rib Roast.* — The best cuts for roasting are called the prime ribs. Have the ribs removed and

[1] Pork, lamb, mutton, and veal roasts are cooked in the same way as beef roast, but they require a longer time for cooking, as they should never be served rare as beef is served. They require at least twenty minutes per pound.

have the meat rolled. This insures more even cooking than if the bones are left in, for when they are, the thin part is overdone before the rest is cooked. If the meat has but little fat, have a piece of suet rolled in with the roast, and remove it before the roast is sent to the table to serve.

Sprinkle salt and pepper on the meat, and dredge with flour. This is done so as to form a crust and prevent the escape of the juice. Have the oven very hot at first so as to sear the outside quickly and retain the juice. After ten minutes reduce the heat so as to insure thorough cooking. If the oven is very hot all the time, the outside will burn while the inside is raw. Baste the meat occasionally with the drippings. Never add water to a roast unless the meat has so little fat that there is danger of burning or charring. Never add it until after the first fifteen minutes. Allow fifteen minutes' cooking to each pound of meat. That is, allow an hour for a four-pound roast, and an hour and a half for a six-pound roast.

Brown Gravy. — Pour off some of the fat from the pan in which the roast has cooked. To the remainder of the fat add three tablespoons of flour, and rub free from lumps. Add one and one half cups of boiling water and cook until it thickens; add one fourth teaspoon of salt and a speck of pepper.

Yorkshire Pudding. — One half cup of milk, one half cup of flour, one egg, one eighth teaspoon of salt. Mix the salt and flour; add milk and rub smooth; add egg well beaten. Pour into the pan where the roast beef is cooking, or cover the bottom of another pan with some of the drippings from the roast, and pour the mixture over the fat. Bake in a hot oven twenty minutes, and serve with roast beef.

Lamb Chops. — Select rib or loin chops and remove the skin and some of the fat. If all the fat is removed, the chops will be dry and tasteless. Have the frying pan smoking hot, and place a small piece of the fat from the meat on a fork and rub the pan with it. Remove the fat and place the chops in the pan. When one side is seared over, turn the chops and sear the other side, turn frequently to prevent burning, and cook at a lower temperature after the first few minutes. Cook long enough so that the chops will not be rare,—from eight to twelve minutes, depending on the thickness of the cut. When done, season with salt and pepper; serve immediately. Mutton and pork chops are cooked in the same way.

Veal Cutlets. — Cut the cutlets in pieces for individual servings. Sprinkle with salt and pepper, dip in crumbs or flour, egg, and crumbs, and fry in bacon fat, lard, or butter, until well browned. Cook slowly so that the cutlets will be cooked throughout. Pour Brown or Tomato Sauce over, and simmer twenty minutes.

Brown Sauce. — Brown one fourth cup of butter; add one fourth teaspoon of chopped onion and brown; add three tablespoons of flour and stir until browned; add one and one half cups of boiling water and cook until it thickens. Add one fourth teaspoon of salt, one eighth teaspoon of pepper. (One half cup of mushrooms or one fourth cup of capers may be added.)

Tomato Sauce. — (See p. 95.)

Fried Chicken. — Cut a young chicken in pieces ready to serve. Sprinkle with salt, pepper, and flour. Place in a deep pan; add one fourth cup of butter, cover the pan, place in a hot oven, and cook from twenty to thirty minutes. Turn several times to cook evenly.

Another method is to place the chicken in the frying pan, add the butter, and fry slowly for fifteen to twenty minutes. Serve with White Sauce made from the butter which remains in the pan.

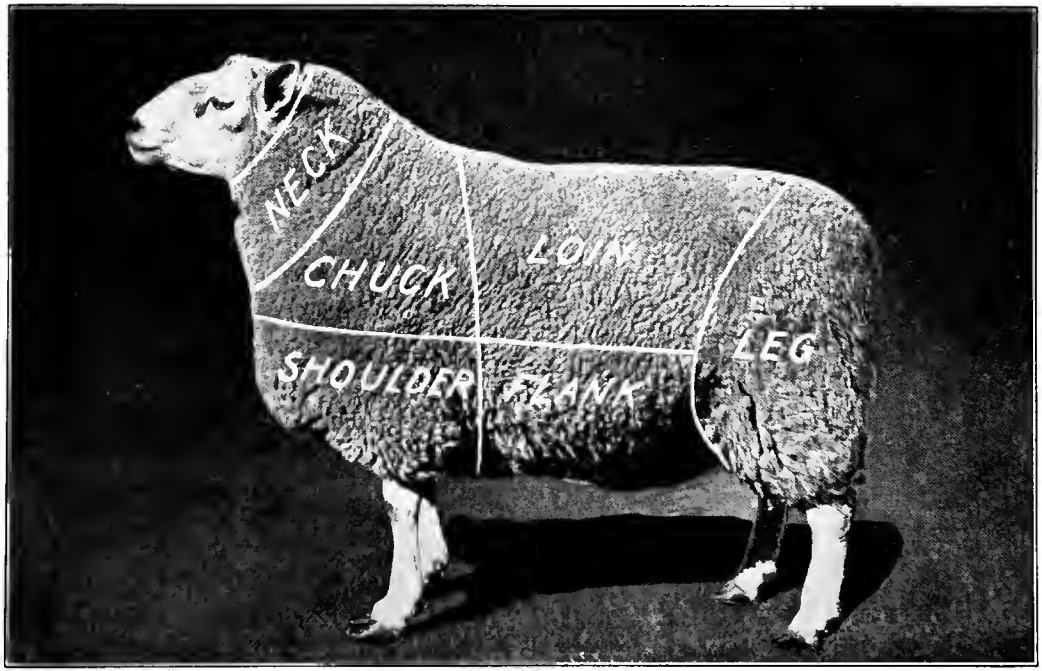
Tougher Cuts — Principle Two

Hamburg Steak. — Pass one pound of round steak through a meat chopper; add one small onion chopped fine, one fourth teaspoon of salt, one eighth teaspoon of pepper, and one beaten egg. Mix thoroughly and shape into about six balls. Fry slowly in a small amount of bacon fat or salt pork, or some of the fat from the meat. Cover the frying pan, and cook ten to fifteen minutes, turn to prevent burning.

Boiled Leg of Mutton. — Remove the skin from the mutton, as the skin gives the meat a strong flavor if cooked on the meat. Place the meat in a kettle, cover with boiling water, and boil about fifteen minutes. Reduce the heat and let the meat simmer from two and one half to three hours, depending on the size of the leg. When nearly done, add salt and pepper. Serve with mint or caper sauce.

Mint Sauce. — One half cup of mint chopped fine; add two tablespoons of sugar, three tablespoons of vinegar, three tablespoons of boiling water, one eighth teaspoon of salt. Let it boil for three minutes, and then remove from the stove and let it stand for fifteen minutes.

Meat in Casserole. — Cut round beef steak or shoulder of mutton into one and one half inch pieces, and brown in a hot frying pan in beef or bacon fat. When the meat is seared, place it in the casserole and brown an onion in the fat. Add onion and fat to the meat, and cover with water.



CUTS OF MUTTON.

(From Conley's *Nutrition and Diet.*)

Place the cover on the casserole, put it in the oven, and let the meat cook slowly for two hours. Cut one cup of carrots and two cups of potatoes into balls or slices, add to the meat; add one half teaspoon of salt and one eighth teaspoon of pepper, and cook until the potatoes are done. Serve from the casserole.

Mutton Stew and Dumplings. — One and one half pounds of mutton from shoulder, cut in small pieces; add one onion and one carrot, sliced; cover with boiling water and boil fifteen minutes; reduce the heat and let simmer one and one half hours. Turn meat from kettle, season. Place potatoes in bottom of kettle, place meat on the potatoes, pour liquid over this, and add enough boiling water to cover all; place dumplings on top of meat, and boil twenty minutes.

Dumplings. — Mix two cups of flour, four teaspoons of baking powder, one fourth teaspoon salt. Add two tablespoons of lard as for biscuit. Moisten with one cup of water. Shape into six dumplings, and cook with meat and potatoes.

Beef Loaf. — Two pounds of beef from round, one teaspoon of salt, one half cup grated bread crumbs, speck of dressing seasoning, one fourth pound of pork, one teaspoon of chopped onion, one egg. Pass meat through a chopper, mix all ingredients, shape into a loaf, sprinkle with flour, and bake one hour. Serve with tomato or mushroom sauce, or plain. Garnish with parsley.

Tomato Sauce. — One pint of tomatoes, one half onion chopped fine. Cook ten minutes. Put through a sieve. Melt four tablespoons of butter, rub in four tablespoons of flour; add one half teaspoon of salt, one eighth teaspoon of pepper; add the tomato, and cook until it thickens.

Mincemeat. — Boil five pounds of lean beef four or five hours until it is ready to fall to pieces, remove bone, and chop fine. Add two pounds of beef suet chopped fine, four pounds of raisins, four pounds of currants, one pound of citron, four quarts of chopped apples, four tablespoons of cinnamon, four tablespoons of cloves, four tablespoons of nutmeg, three teaspoons of allspice, three teaspoons of pepper, three teaspoons of ginger, juice of three lemons, one pint of molasses, one cup of melted butter, two and one half pounds of sugar, two and one half quarts of boiled cider. Mix thoroughly and store in a cool place.

Hungarian Goulash. — Cut a two-inch piece of fat pork or beef suet in small pieces, and fry out. Cut one and one half pounds of beef from the round into small pieces, season with salt and pepper, and roll in flour and then fry in the fat until brown. Place the beef in a kettle, add one chopped onion, one chopped green pepper, one cup of chopped celery, two cups of canned tomatoes, cover with boiling water, and let it simmer about two hours.

Chicken Pie. — Purchase a chicken about a year old, because it is fatter and better flavored for boiling than the young ones. Remove the legs and cut each leg into two portions; remove wings; cut breast into two parts, also the back. Place in a kettle; cover with boiling water and boil ten minutes, and then simmer until the meat is tender, — from one and one half to two hours, depending on the toughness of the meat. When half done, add one teaspoon of salt and one eighth teaspoon of pepper. Remove the chicken from the kettle; thicken the stock with one fourth to one third of a cup of flour which has been rubbed smooth in cold water. If there is but little fat on the chicken, add

several tablespoons of butter to the broth. Return chicken to the kettle, and let it simmer in the broth for several minutes. When ready to serve, add small baking powder biscuits broken in two.

Warmed-over Meats

Hash. — One cup of chopped cooked meat, one cup of cooked potatoes sliced in small pieces, one fourth cup of boiling water, two tablespoons of butter, one tablespoon of onion chopped fine, one half teaspoon of salt, speck of pepper. Cook slowly until it begins to brown; turn, and serve hot.

Creamed Dried Beef. — One half cup of dried beef shredded with a knife into small pieces. Soak in cold water about five minutes. Make White Sauce, omitting the salt; add dried beef, bring to the boiling point, and serve with potatoes or on toast.

Beefsteak Pie. — Remove fat and bone from remnants of roast beef or steak. Use about two cups cut into small pieces; add one small chopped onion, one fourth teaspoon of salt, speck of pepper; cover with boiling water, and let it simmer about one hour. Then thicken the liquid with two tablespoons of flour, and remove to a baking dish, place biscuit dough on top of the meat, and bake in the oven until the crust is done. The gravy or juice should completely cover the meat, otherwise it will cook dry.

For biscuit dough use one cup of flour, one and one half teaspoons of baking powder, one fourth teaspoon of salt, two and one half tablespoons of lard or butter.

Soup — Principle Three

Soup Stock

Soup stock is the soluble part of meat and bone, with vegetables and seasoning added. It forms the basis of all meat soups, of aspic jelly, of some sauces.

It may be made from the remnants of roasts or steaks with some fresh meat added; from the trimmings of roasts that are sent with the meat; from the tougher parts of meat not cooked or served. It is made from beef, veal, lamb, mutton, and chicken; sometimes two or more kinds of meat are used. The bones of the young animals are better for soup making because they contain more gelatin; the meat of the older animals is best because it is juicier. For the first reason, bones of veal or chicken are sometimes added to the soup kettle. Some of the meat is frequently seared over by using some of the fat. This gives a dark color to the soup stock and adds flavor. Sometimes caramel is used to darken it.

Beef Soup Stock. — Select meat from the rump, shin, or neck, and be sure to get about two thirds lean meat and one third fat and bone, about four pounds in all. Place some of the fat in a frying pan and brown a small portion of the meat. Cut the meat, fat, and bone into small pieces. Place it in a soup kettle and add four quarts of water. Let it stand in the cold water one hour to draw out the juices and soluble albumin, then add the browned meat, heat slowly, and cook at a low temperature for four or five hours. Add one fourth cup each of onion, carrots, celery cut into small pieces; a sprig of parsley, one bay leaf, one teaspoon of salt, one eighth teaspoon of pepper, and simmer one hour. Strain and cool quickly. Let it stand

in a cold place until the fat rises to the top and solidifies. The stock will keep so long as the fat covers it. When it is to be used, skim off all of the fat, and reheat with whatever additional ingredients are desired.

Tomato soup may be made by adding tomatoes; or pearl barley, macaroni, noodles, or vegetables may be added.

In the process of soup making the connective tissue is softened and dissolved; the soluble albumin, juices, and extractives are drawn out, but very little of the nutritive value from the meat is in the soup. The remaining meat is tasteless because the extractives which give meat its flavor have been drawn out and the dissolving of the connective tissue has left the meat stringy. The albumin that is in the soup becomes coagulated by heat and is the brown scum that floats on the surface. If the scum is taken off, some of the nutrients are lost.

FISH

Fish are classified in two classes, — those having a backbone and called vertebrates, and the shellfish. The vertebrates are classified as fresh and salt water fish, and also as white-meat fish, and dark-meat fish. They are classified in various other ways, but to apply the principles of cooking, all vertebrates may be grouped in one general class.

Fish are similar to meat in composition, structure, and nutritive value, in that they are protein foods. They take the place of meat in any meal. The muscle consists of bundles of fibers bound together by connective tissue. There is a marked difference in this tissue from that in meat; the connective tissue in fish is so tender that they require but little cooking, and when they are boiled, care must be taken or the connective tissue will be dissolved

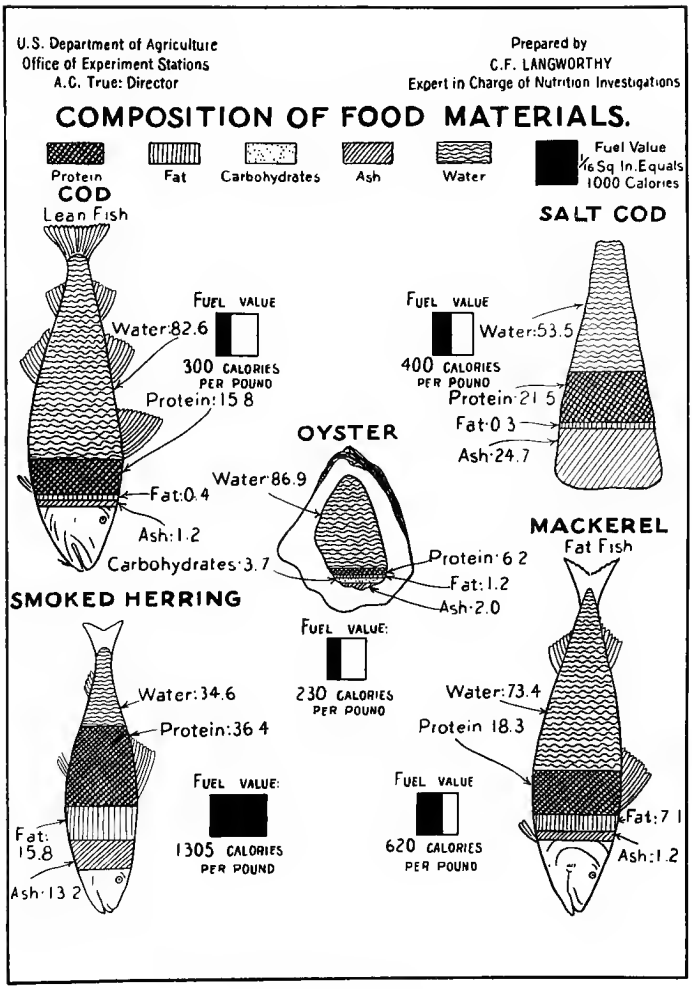
and the muscle fibers will fall apart. For this reason fish are best when broiled, baked, or fried.

Selection and Cleaning. — Care must be taken when purchasing fish that they are fresh, because fish decompose readily and do not keep for any length of time after they are taken from the water. In fresh fish the eyes are bright, the gills are bright red, and the flesh is firm. When fish are purchased from the market, they are cleaned, though the scales are not always removed. They may be removed with a knife or a fish scaler sold for that purpose. Begin at the tail and work towards the head, holding the fish firmly by the tail. Wash the fish inside and out with plenty of cold water, and dry with a soft cloth.

Baked Fish. — Remove the head from the fish; sprinkle the inside with salt, pepper; add a tablespoon of lard, bacon drippings, or olive oil, and sew or fasten the sides together. Roll the fish in flour, place in a baking pan, add one fourth cup of lard, or bacon fat or olive oil, and bake until brown, from thirty to forty-five minutes, depending on the size of the fish. Serve with Tartare Sauce, Drawn Butter, or Hollandaise Sauce.

Fried Fish. — Fish may be fried whole, or skinned and boned and cut into slices. Fish like fresh salmon and lake trout are sold sliced and ready for frying. Season with salt, pepper, and roll in flour or corn meal, or in egg and crumbs. Sauté slowly in bacon fat, salt pork, lard, or olive oil until deep brown, or fry in deep fat.

Tartare Sauce. — Mix one tablespoon of vinegar, one teaspoon of lemon juice, one fourth teaspoon of salt, one tablespoon of Worcestershire sauce, and heat over hot water. Brown one fourth cup of butter, and add it slowly to the mixture. Serve hot with fish.



COMPOSITION OF FISH.

Drawn Butter Sauce. — Melt three tablespoons of butter; add two tablespoons of flour, one fourth teaspoon of salt, one eighth teaspoon of pepper, and brown the mixture. Add one cup of water and stir until it begins to boil, and then simmer for five minutes. Add two tablespoons of butter, in bits; beat it until it is absorbed, and then serve immediately on fish.

Steamed Salmon Loaf. — One can of salmon, four tablespoons of milk, three eggs, four tablespoons of melted butter, one half cup of bread crumbs, speck of pepper, one fourth teaspoon of salt, one teaspoon of chopped parsley. Rub butter into salmon, put crumbs into the beaten eggs, mix all together, season, steam one hour, or bake twenty minutes.

Sauce. — One cup of milk, one tablespoon of cornstarch, one tablespoon of butter, juice from the salmon, one egg, speck of salt. Cook until it thickens, and serve with the salmon.

Oysters

Oyster Stew. — Heat one pint of milk and one pint of water, or one quart of milk, to the boiling point. Add one pint of oysters, three tablespoons of butter, one half teaspoon of salt, one eighth teaspoon of pepper, and cook until the edges of the oysters begin to curl. Serve immediately.

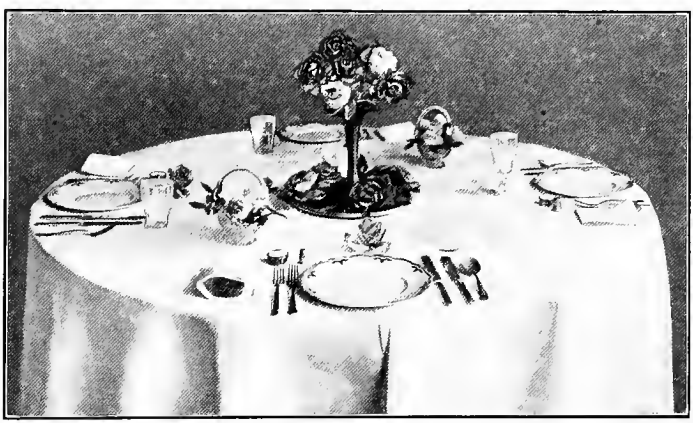
Fried Oysters. — Purchase large select oysters for frying. Wash and drain the oysters, and dry on a soft cloth. Season with salt and pepper and then dip the oysters in bread crumbs, slightly beaten egg, and crumbs, and sauté in butter until brown on both sides, or fry in deep fat.

Scalloped Oysters. — Roll two cups of bread or cracker crumbs until fine. Melt one half cup of butter and mix it

with the crumbs. Mix one pint of oysters, one teaspoon of salt, one eighth teaspoon of pepper, and one cup of milk. Spread one third of the crumbs in the bottom of the baking dish, cover with one half of the oysters, put in another third of the crumbs and the remainder of the oysters, cover with the rest of the crumbs, and bake 20 to 30 minutes.

PLANNING AND SERVING A DINNER

After the meat lessons, the pupils are prepared to plan and serve a dinner, following the same method pursued for the breakfasts and lunches.



A Dinner Table.

Dinner may consist of the following courses: —

1. Soup
2. Meat, potato, and one other vegetable
3. Dessert

1. Meat, potato, and one other vegtable
2. Salad
3. Dessert

SUGGESTED MENUS

1

Cream of Celery Soup
Beef Loaf — Tomato Sauce — Mashed Potato
Creamed Cauliflower
Lemon Pie

2

Veal Cutlets — Brown Sauce — Baked Potato
Lima Beans
Cabbage Salad or Waldorf Salad
Chocolate Pudding

3

Leg of Mutton — Riced Potatoes — Squash
Lettuce Salad
Caramel Ice Cream — Cake

4

Cream of Tomato Soup
Fried Chicken — Baked Potato — Creamed Peas
Banana and Nut Salad
Bavarian Cream

CHAPTER XIII

GELATINS AND ICES. SOME ADDITIONAL RECIPES

GELATIN

GELATIN is manufactured from the albuminoids in meat, — ossein in bone, elastin in cell walls, collagen in connective tissue. Bone, tendons, ligaments, and all forms of connective tissue are boiled, and the substance extracted forms gelatin when cooled. It occurs in greatest abundance in the bones of young animals.

Gelatin does not build tissue, but yields heat and energy when oxidized. Its food value is not very high, as so small a quantity of it is used at a time. It is easily digested and furnishes a vehicle for adding nutritious foods to the diet, as it makes it possible to serve them in attractive ways.

General Directions. — One box of pulverized gelatin contains four tablespoons of gelatin. It should be soaked in one cup of cold water for ten minutes. Add one quart of boiling water, but never boil gelatin, or the thickening power is destroyed. For thick jelly use less water. Pineapple juice should be boiled before gelatin is added, as the fresh pineapple contains a ferment that prevents the gelatin from thickening.

Fruit Salad. — Dissolve one box of Knox pulverized gelatin in one cup of cold water. Boil one pint of canned pineapple, remove from the fire, add juice of two lemons, three oranges, and one cup of sugar; add one pint of boiling water to the dissolved gelatin, the fruit juice, one cup

of celery cut fine, and one fourth pound of shelled and blanched almonds split lengthwise. Turn into molds, and let stand until it stiffens. Serve with Cooked Dressing which has been thinned with whipped cream.

Aspic Jelly. — Aspic is stock, cleared or uncleared, to which gelatin has been added. Four tablespoons of gelatin are usually used to five cups of stock. Soak the gelatin in one cup of cold water, and pour the boiling hot stock over. Tomatoes, pimentoes, tongue, chicken, delicate vegetables, sweetbreads, are molded in aspic. The mold is lined with the aspic, and as soon as it begins to set, the solid food to be molded is added, and more aspic is used to cover it. If the other ingredients were added before the jelly begins to set, they would not be evenly distributed throughout, but would float on top.

JELLY SERVED WITH WHIPPED CREAM OR FRUIT.

Lemon Jelly. — Soak two tablespoons of gelatin (Knox) in one half cup cold water for ten minutes. Pour over this slowly two cups of boiling water, and stir until dissolved. Add one cup of sugar and one half cup of lemon juice. Turn into mold, and chill.

Orange Jelly. — Soak two tablespoons of gelatin in one half cup of cold water for ten minutes. Pour over this slowly two cups of boiling water, and stir until dissolved. Add one cup of sugar, one and one half cups orange juice, and three tablespoons lemon juice. Turn into molds, and chill.

Snow Pudding. — Soak one tablespoon of gelatin in one fourth cup of cold water, and add one cup of boiling water, one cup of sugar, one fourth cup of lemon juice. Prepare as for lemon jelly. When mixture has thickened, beat until frothy. Add whites of three eggs beaten stiff, and continue beating until stiff enough to hold its shape. Mold or pile by spoonfuls on a dish. Serve cold with boiled custard.

Maple Bavarian Cream. — Dissolve one tablespoon of gelatin in four tablespoons of cold water. Scald two thirds cup of maple sirup, add two egg yolks, and cook until it thickens. Add gelatin; stir constantly until it begins to thicken. Add one and one half cups of cream whipped stiff and one half teaspoon of vanilla. Turn into a mold, and let stand until it stiffens.

Pineapple Bavarian Cream. — Soak one tablespoon of gelatin in four tablespoons of cold water. Boil one cup of grated pineapple, four tablespoons of sugar, and one fourth cup of lemon juice. Add the gelatin, and stir constantly until it begins to thicken. Add one and one half cups of cream whipped stiff. Turn into a mold, and let it stand until it stiffens.

Pistachio Salad. — Soak one half box of gelatin in one half cup of cold water. Add one cup of boiling water, two tablespoons of sugar, the juice of two oranges and one lemon. Color with green coloring. Turn into cups to

stiffen. After the gelatin begins to set, add one half pound of chopped walnuts, two cups of chopped celery, and let stand until stiff; turn from cups and serve with Cooked or Mayonnaise Dressing.

ICES

Frozen Desserts. — Frozen dishes may be grouped in two general classes, — those containing cream, as ice cream, parfait, and mousse; and those made from water and fruit juice, as ices, sherbet, frappé, and punch. The number of combinations of milk, cream, fruit, nuts, fruit juice, and flavorings is practically limitless, and many names are given to the different combinations. The directions for freezing and packing are practically the same in every case, except where whipped cream is used. In this case the mixture is frozen without stirring.

Directions for Freezing. — Purchase coarse rock or ice cream salt. Place the ice in a bag and tie loosely; crush with the broad side of an ax or wooden mallet until the pieces are small and of uniform size. Snow may be used in place of ice. Have the mixture to be frozen ready. Scald the ice cream can, and rinse and dry just before using it. Place the mixture in the can (the can should not be more than three fourths full of the mixture to be frozen, as it expands during freezing). Place the can in the wooden tub of the freezer, insert the dasher, put on the cover and the top. Place the cork or plug in the opening in the side of the freezer, and leave it there until the mixture is frozen. Use three measures of ice to one of salt, and pack the freezer solidly. When snow is used, less salt is needed, as the snow is loosely packed. Turn the crank slowly at first, and then more rapidly after the mixture begins to freeze. Salt

solution has a lower freezing point than pure water, so when the salt dissolves, the salt solution cannot stay solid at the temperature of the ice. Any substance going into solution absorbs heat. This heat absorbed by the dissolving of the salt is taken from the contents of the can. Ice melting absorbs heat. This heat is also taken from the contents of the can. Care must be taken that the salt water in the tub of the freezer does not reach above the cover of the can, or it will enter the can. After the mixture is frozen sufficiently, draw off the water by removing the cork or plug, remove the cover and dasher and pack the cream solidly, then replace the cover, and pack the freezer again with ice and salt, but do not insert the cork.

Lemon Ice. — To four cups of boiling water add two cups of sugar and the grated rind of two lemons. Boil five minutes. Add one half cup of lemon juice, strain, cool, and freeze.

Orange Ice. — Four cups of water, two cups of sugar, one fourth cup of lemon juice, grated rind of two oranges, and juice of four oranges. Make sirup as for lemon ice; add fruit juice, cool, strain, and freeze.

Ice Cream. — To one quart of thin cream add three fourths cup of sugar and one half teaspoon of vanilla or any other flavor desired. Freeze.

Maple Mousse. — Four eggs, yolks and whites separate, one cup maple sirup, one quart of cream, one teaspoon of vanilla. Beat the yolks of the eggs very light, stir in one cup of maple sirup, and cook until it thickens, stirring constantly. Cool. Add one quart of cream and the beaten whites of the eggs and vanilla. Strain, cool, and freeze.

Cranberry Sherbet. — Wash one quart of cranberries, cover with one pint of cold water, and cook until soft. When

soft, press through a fruit press, and add enough water to make one quart of juice. Add the juice of two oranges and two cups of sugar, and heat to the boiling point. Chill, turn into the freezer, and freeze. Serve with turkey, chicken, or game course.

SOME ADDITIONAL RECIPES

To be used with the meat lessons when not enough work is provided to keep the pupils occupied.

Simple Layer Cakes. — Bake plain cake in two layer cake pans, and use any of the following fillings and frost the top with White Frosting.

Marshmallow Cream Filling. — Beat one cup of cream until stiff, add one fourth cup of powdered sugar, one half teaspoon of vanilla, one egg white beaten stiff and dry, and one half cup of marshmallow cut into small pieces. Spread between the layers and on top, and serve while fresh.

Lady Baltimore Filling. — Make White Frosting and to one half of it add one half cup of chopped raisins, one half cup of chopped nuts, and three chopped figs. Spread between the layers, and frost the top with the remainder of the frosting.

Fig Filling. — Chop one fourth pound of figs, add one half cup of cold water and one fourth cup of sugar, and boil until it thickens. Spread between the layers, and frost the top of the cake.

Chocolate Filling. — (See p. 130, Chocolate Frosting.)

Blitz Kuchen. — One cup of butter, or one half cup of butter and one half cup of lard, creamed until soft, add one cup of sugar and mix thoroughly. Add four beaten eggs, and beat until thoroughly blended. Add alternately three fourths cup of milk and two cups of flour in which three

teaspoons of baking powder and one fourth teaspoon of salt, one teaspoon of cinnamon, have been sifted. Add grated rind of one lemon. Spread in a shallow pan about one fourth inch thick. Sprinkle with three fourths cup of nuts, one fourth cup of sugar and cinnamon. Bake in a hot oven.

Cottage Pudding. — Cream one fourth cup of butter, add two thirds cup of sugar, one egg, one cup of milk, two and one fourths cups of flour, four teaspoons of baking powder, one fourth teaspoon of salt. Mix as for Plain Cake. Bake thirty-five minutes and serve with Vanilla or Hard Sauce.

Hard Sauce. — Cream one third cup of butter; add one cup of powdered sugar gradually; add one fourth teaspoon of flavoring, and shape into small balls.

Rice Pudding. — Cook one half cup of rice in one pint of boiling water for twenty minutes, or until soft. Add one half cup of sugar, one pint of milk, two well-beaten eggs, one half cup of raisins, speck of nutmeg, and bake slowly until firm.

Bread Pudding. — Mix one pint of bread crumbs, one quart of milk, one cup of sugar, four egg yolks, two tablespoons melted butter, and the juice of lemon or one teaspoon of lemon extract. Beat until blended. Turn into a baking dish and bake three quarters of an hour. Take from oven, spread jam or jelly over the top, cover with the whites of four eggs beaten stiff and dry, to which has been added four tablespoons of sugar and one fourth teaspoon of lemon extract. Return to the oven until the eggs are browned. Serve with cream.

Date Pudding. — Wash one pound of dates and remove the stones, add one cup of walnuts chopped, one half cup of sugar, two eggs well beaten, and one half cup of flour and two teaspoons of baking powder sifted together. Mix well,

and bake slowly about two hours. Pour one cup of cream over the pudding while it is warm, and serve with whipped cream.

Fig Pudding. — Wash and dry one pound of figs and cut into small pieces. Cream one cup of shortening; add two cups of sugar and three unbeaten eggs. Sift together three cups of bread crumbs, one half teaspoon of nutmeg, one teaspoon of cinnamon, and add to the first mixture. Add one half cup of milk and the figs, and beat well. Turn into two buttered molds, and steam one to one and one half hours.

Blueberry Pudding. — Cream two thirds cup of butter, add two thirds cup of sugar, two eggs well beaten, three fourths cup of milk, and two cups of flour, three teaspoons of baking powder, one fourth teaspoon of salt, sifted together. Mix as for cake. When well beaten, add two cups of floured blueberries. Turn into two buttered molds. Steam one hour, and then bake one half hour. Serve with Hard Sauce and whipped cream.

Marguerites. — Boil one cup of sugar and one half cup of water until it threads. Cut six marshmallows in small pieces and add to the sirup. After the marshmallows are dissolved, add the sirup to the beaten whites of two eggs; add one fourth teaspoon of vanilla, one cup of chopped nut meats, one half cup of chopped figs or dates. Spread on crackers, and serve with ices.

Torte. — Beat the whites of five eggs until stiff and dry; add two and one half cups of powdered sugar and continue beating until thoroughly blended; add one tablespoon of vinegar and one teaspoon of vanilla. Line two shallow pans with oiled or greased paper, and bake in a very slow oven for at least an hour. Put strawberries, pineapple, or peaches between the layers and whipped cream on top.

Cream Puffs. — Put one half cup of butter and one cup of boiling water into a stewpan, and let it come to the boiling point. Gradually add one cup of flour, and boil two minutes, stirring constantly. Remove from the fire, and add four unbeaten eggs one at a time, mixing thoroughly after each egg is added. Drop by spoonfuls about two inches apart on greased paper. Bake one half hour in a moderate oven.

Almond Cookies. — Cream one half cup of butter; gradually add one and one fourth cups sugar, one half cup of sour milk, one beaten egg, one half teaspoon of almond extract, and one fourth teaspoon salt, one half teaspoon soda, and two cups of flour sifted together. Mix thoroughly, roll thin, and bake in a hot oven.

Rocks. — Cream one cup of shortening; add one and one half cups of sugar, three eggs well beaten, two tablespoons of water, one teaspoon soda, one teaspoon cinnamon, one fourth teaspoon salt, two and one half cups of flour sifted together. Add one cup of chopped walnuts and one cup of raisins. Drop by spoonfuls on greased paper one and one half inches apart, and bake in a hot oven.

Molasses Cookies. — Cream three fourths cup of shortening; add one cup of sugar, one cup of molasses, and one cup of boiling water. Place on the stove, and let it come to the boiling point. Remove from the stove and cool. Add one beaten egg, one half teaspoon of soda, two teaspoons of cinnamon, two teaspoons of ginger, one teaspoon of cloves, and three and one half cups of flour sifted together. Mix thoroughly. Drop by spoonfuls on greased paper one inch apart, and bake in a hot oven.

Prune Pie. — Wash three fourths pound of prunes and soak overnight or several hours in cold water. Cook until

soft; add one half cup of sugar, two tablespoons of flour, one tablespoon of butter, one half tablespoon of lemon juice, one fourth teaspoon of salt. Line a plate with crust and cover with an upper crust.

Raisin Pie. — Mix one and one half cups of chopped raisins, one half cup of sugar, one cup of water, one tablespoon of flour, and one lemon cut into thin slices. Line the plate with crust, and cover with one half inch strips of crust.

Chocolate Pie. — Mix four tablespoons of cornstarch, one half cup of sugar, four tablespoons of grated chocolate, one eighth teaspoon of salt, add three egg yolks and two cups of milk, and cook until it thickens, stirring constantly. Add one teaspoon of vanilla. Bake the crust as for lemon pie. Fill the crust with the filling, and cover with the whites of three eggs beaten stiff, to which two tablespoons of sugar have been added, and bake until brown. Serve cold.

Devil's Food. — Cream one half cup of butter, add one cup of sugar, mix thoroughly. Add the yolks of two eggs, one half cup of sour milk in which one teaspoon of soda has been thoroughly dissolved, two cups of flour, and lastly the whites of two eggs, and one teaspoon of vanilla.

Grate three ounces of chocolate, mix with one half cup of sweet milk, one half cup of sugar, and the yolk of one egg. Boil until stiff, in double boiler, then add to the white dough, beat thoroughly and bake in a moderate oven, about forty-five minutes.

Tables Showing the Chemical Composition of Foods Commonly Used in the Average American Diet

Taken from Bulletin 28, Office of Experiment Stations, and Farmers' Bulletin 142, U. S. Department of Agriculture

Food	Water	Protein	Fat	Carbohydrate	Cellulose	Mineral Matter
Cereals	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Wheat	10.6	12.2	1.7	71.3	2.4	1.8
Corn	10.8	10.0	4.3	71.7	1.7	1.5
Oats	11.0	11.8	5.0	59.7	9.5	3.0
Rye	10.5	12.2	1.5	71.8	2.1	1.9
Rice	12.0	8.0	2.0	76.0	1.0	1.0
Barley	10.9	11.0	2.3	69.5	3.8	2.5
Buckwheat	12.6	10.0	2.2	64.5	8.7	2.0
Legumes						
Fresh Legumes:						
String beans	89.2	2.3	.3	7.4	1.9	.8
Shelled kidney beans	58.9	9.4	.6	29.1	1.7	2.0
Shelled lima beans	68.5	7.1	.7	22.0	1.7	1.7
Shelled peas	74.6	7.0	.5	16.9	1.7	1.0
Dried Legumes:						
Lima beans	10.4	18.1	1.5	65.9	..	4.1
Navy beans	12.6	22.5	1.8	59.6	4.4	3.5
Lentils	8.4	25.7	1.0	59.2	..	5.7
Dried peas	9.5	24.6	1.0	62.0	4.5	2.9
Peanuts	9.2	25.8	38.6	24.4	2.5	2.0
Roots and Tubers						
Potato	78.3	2.2	.1	18.0	.4	1.0
Sweet potato	69.	1.8	.7	26.1	1.3	1.1
Beets	87.5	1.6	.1	8.8	.9	1.1
Celeriac	84.1	1.5	.4	11.8	1.4	.8
Carrots	88.2	1.1	.4	8.2	1.1	1.0

TABLES SHOWING THE CHEMICAL COMPOSITION OF FOODS COMMONLY USED IN THE AVERAGE AMERICAN DIET — *Continued*

FOOD	WATER	PROTEIN	FAT	CARBO-HYDRATE	CELLULOSE	MINERAL MATTER
ROOTS AND TUBERS	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Parsnips	83.0	1.6	.5	11.0	2.5	1.4
Salsify	85.4	4.3	.3	6.8	2.0	1.2
Turnips	89.6	1.3	.2	6.8	1.3	.8
Rutabagas	88.9	1.3	.2	7.3	1.2	1.1
Onions	87.6	1.6	.3	9.1	.8	.6
FRESH FRUITS						
Apples	84.6	.4	.5	13.0	1.2	.3
Apricots	85.0	1.1	..	13.4	..	.5
Bananas	75.3	1.3	.6	21.0	1.0	.8
Blackberries	86.3	1.3	1.0	8.4	2.5	.5
Cherries	80.9	1.0	.8	16.5	.2	.6
Cranberries	88.9	.4	.6	8.4	1.4	1.5
Currants	85.0	1.5	..	12.8	..	.7
Grapes	77.4	1.3	1.6	14.9	4.3	.5
Lemons	89.3	1.0	.7	7.4	1.1	.5
Muskmelons	89.5	.6	..	7.2	2.1	.6
Olives	67.0	2.5	17.1	5.7	3.3	4.4
Oranges	86.9	.8	.2	11.6	..	.5
Peaches	89.4	.7	.1	5.8	3.6	.4
Pears	80.9	1.0	.5	15.7	1.5	.4
Pineapples	89.3	.4	.3	9.3	.4	.3
Plums	78.4	1.0	..	20.1	..	.5
Raspberries, red	85.8	1 0	..	9.7	2.9	.6
" black	84.1	1.7	1.0	12.6	..	.6
Strawberries	90.4	1.0	.6	6.0	1.4	.6
Watermelons	92.4	.4	.2	6.7	..	.3
DRIED FRUITS						
Apples	26.1	1.6	2.2	62.0	6.1	2.0
Apricots	29.4	4.7	1.0	62.5	..	2.4

TABLES SHOWING THE CHEMICAL COMPOSITION OF FOODS COMMONLY USED IN THE AVERAGE AMERICAN DIET — *Concluded*

FOOD	WATER	PROTEIN	FAT	CARBOHYDRATE	CELLULOSE	MINERAL MATTER
DRIED FRUITS	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Citrons	19.0	.5	1.5	78.1	..	.9
Dates	15.4	2.1	2.8	74.6	3.8	1.3
Figs	18.8	4.3	.3	68.0	6.2	2.4
Pears	16.6	2.8	5.4	66.0	6.9	2.4
Prunes	22.3	2.1	..	71.2	2.1	2.3
Raisins	14.6	2.6	3.3	73.6	2.5	3.4
Currants	17.2	2.4	1.7	71.2	3.0	4.5
NUTS						
Almonds	4.5	21.0	54.9	17.3	2.0	2.0
Hickory nuts	3.7	15.4	67.4	11.4	..	2.1
Pecans	2.7	9.6	70.5	15.3	..	1.9
Walnuts	2.5	18.4	64.4	13.0	1.4	1.7
MILK AND PRODUCTS						
Whole milk	87.0	3.3	4.0	5.0	..	.7
Skim milk	90.5	3.4	.3	5.1	..	.7
Buttermilk	91.0	3.0	.5	4.8	..	.7
Condensed milk	26.9	8.8	8.3	54.1	..	1.9
Cheese, Cheddar	27.4	27.7	36.8	4.1	..	4.0
Full cream	34.2	25.9	33.7	2.4	..	3.8
Roquefort	39.3	22.6	29.5	1.8	..	6.8
Swiss	31.4	27.6	34.9	1.3	..	4.8
Neufchatel	50.0	18.7	27.4	1.5	..	2.4
Cottage	72.0	20.9	1.0	4.3	..	1.8
Eggs	74.7	14.8	10.5	..	..	1.0

TABLES SHOWING THE AMOUNT OF REFUSE IN SOME VEGETABLES, AND IN MEATS AND FISH

	Refuse	Water	Protein	Fat	Carbohydrate	Mineral Matter
VEGETABLES	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Cabbage . . .	15.5	77.7	1.4	.2	4.8	.9
Celery . . .	20.0	75.6	.9	.1	2.6	.8
Cucumbers . .	15.0	18.1	.7	.2	2.6	.4
Lettuce . . .	15.0	80.5	1.0	.2	2.5	.8
Spinach . . .	..	92.3	2.1	.3	3.2	2.1
Tomatoes . .	..	94.3	.9	.4	3.9	.6
BEEF, FRESH:						
Chuck, ribs .	16.3	52.6	15.0	14.3	..	.6
Loin, medium	13.3	52.5	15.6	16.6	..	.7
Ribs . . .	20.8	43.8	13.5	20.0	..	.5
Round, medium . .	7.2	60.7	18.4	12.2	..	.8
Shoulder and clod . .	16.4	56.8	15.9	9.3	..	.7
BEEF, DRIED AND SMOKED	4.7	53.7	25.6	6.6	..	5.5
VEAL:						
Cutlets, round	3.4	68.3	19.5	7.1	..	.8
Leg . . .	14.2	60.1	15.0	7.5	..	.7
MUTTON:						
Leg . . .	18.4	51.2	14.6	14.0	..	.6
Loin . . .	16.0	42.0	13.1	26.9	..	.5
PORK, FRESH:						
Loin chops .	19.7	41.8	13.0	23.0	..	.6
Ham . . .	10.7	48.0	13.1	24.6	..	.6
PORK, SALTED AND SMOKED						
Bacon . . .	7.7	17.4	8.8	59.1	..	3.1
Ham . . .	13.6	34.8	13.8	31.7	..	3.2
Salt, fat . .	..	7.9	1.8	81.9	..	2.9

TABLES SHOWING THE AMOUNT OF REFUSE IN SOME VEGETABLES, AND IN MEATS AND FISH — *Continued*

	REFUSE	WATER	PROTEIN	FAT	CARBO-HYDRATE	MINERAL MATTER
POULTRY:	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Fowl . . .	25.9	47.1	13.3	11.7	..	.5
Turkey . .	22.7	42.4	15.6	17.5	..	.6
FRESH FISH:						
Black bass. .	46.7	41.9	10.3	.5	..	.6
Cod	29.9	58.5	10.6	.2	..	.8
Mackerel . .	40.7	43.7	11.4	3.5	..	.7
Perch . . .	54.6	34.4	8.7	1.8	..	.5
Pickerel . .	35.9	51.1	11.9	.2	..	.9
Pike. . . .	30.5	55.4	13.0	.4	..	.7
Salmon. . .	23.8	51.2	14.6	9.5	..	.9
Trout, brook .	37.9	48.4	11.7	1.3	..	.7
Trout, lake .	35.2	45.0	12.4	6.6	..	.8
Whitefish . .	43.6	39.4	10.3	3.6	..	.9
PRES'V'D FISH:						
Cod, salt . .	24.9	40.2	16.0	.4	..	18.5 (salt)
Herring, smoked	44.4	19.2	20.5	8.8	..	7.4
CANNED FISH:						
Caviare . .	..	38.1	30.0	19.7	7.6	4.6
Salmon . .	..	63.5	21.8	12.1	..	2.6
Sardines . .	5.0	53.6	23.7	12.1	..	5.3
SHELLFISH:						
Oysters . .	..	88.3	6.0	1.3	3.3	1.1
Clams . .	..	80.8	10.6	1.1	5.2	2.3
Lobsters . .	61.7	30.7	5.9	.7	.2	.8
Shrimps . .		70.8	25.4	1.0	.2	2.6

TEACHING COOKING IN RURAL SCHOOLS

SUGGESTIONS FOR TEACHERS

THE demand for some simple instruction for work in domestic science which can be given in the one-room rural school has been so insistent that the following suggestions have been added for the high school or normal school student who may teach in a rural school.

The actual work of housekeeping may vary in different localities and under different economic conditions, but, by the present generation at least, certain fundamental processes will be carried on in the average home.

These are patching, darning, mending, care, and making of clothes; planning, preparing, and serving meals; marketing and purchasing the things needed in the home and by members of the family; care of the house, including sweeping, dusting, and cleaning; rearing of children and care of sick and aged.

While school instruction in some of these subjects must be purely theoretical and hence of little value unless opportunity can be afforded for practical work, cooking and sewing may be taught in the one-room rural school with simple equipment and no great expenditure of money.

This work will be of little value, however, unless what is learned at school is practiced at home, and for this reason girls' clubs should be organized, contests and school fairs should be held, and school credit should be given for home work.

The lessons suggested may be given for one or two periods a week, preferably the last hour in the session as the work may then extend for a longer period of time without interfering with school work.

As this work is for the one- or two-room school building and as but little space can be utilized, it is best to provide only equipment enough for four pupils to cook at a time, the other members of the class may observe those at work, criticize, and make contributions to the knowledge acquired concerning the lesson. Each pupil in the class should try the recipe at home, and report result. The home work should form the greater share of the work done, and credit should be given for it. A careful record of cooking done at home should be made and kept. It is well to post this record in a conspicuous place in the schoolroom.

EQUIPMENT FOR COOKING IN RURAL SCHOOLS

For four pupils, two pupils working together.

Cupboard made with shelves and curtain in front.

Cans or Mason jars for holding sugar, salt, pepper, baking powder, soda, flour, etc.

A molding board. Board for cutting.

LIST OF UTENSILS AND PRICES

Kitchen table with drawer	$1.50	Two paring knives	$ .20
Two burner oil stove	$1.50 to	Two steel knives	.20
Oven to fit stove	$8.00	Two steel forks	.20
Drip pan to fit oven	.20	Four teaspoons	.20
Teakettle	.50	Two tablespoons	.10
Pail for water	.20	One Dover egg beater	.15
Garbage pail	.20	One spoon egg beater	.10
Two dishpans	.50	Two one-quart bowls	.20

One sieve to fit bowl	$ .05	4 cups and saucers	$ .40
Two measuring cups	.10	4 white plates, large	.40
Two one-pint tin basins	.10	One grater	.05
Two one-quart double boilers	.70	2 muffin pans	.10
Two one-quart stewpans	.50	1 large mixing bowl, 2-quart	.25
Two rolling pins	.10	One soap dish	.05
Two biscuit cutters	.10	One lemon squeezer	.10
One vegetable brush	.05	One match box	.05
Two corks for scouring.		One broiler	.05
One utensil pan	.10	One corkscrew	.05
Two small frying pans	.20	One can opener	.05
Two bread pans	.20	One creamer and sugar	.25
One pie plate	.10	One water pitcher	.15
One tray	.10	Total (excluding stove)	10.00
One two-quart stewpan	.30		
One bread knife	.25	Flour sacks for dish towels, some holders, hemmed dishcloths.	
One butcher knife	.25		
4 white plates, small	.40		

SUGGESTED LESSONS

In addition to actual cooking lessons, have pupils find the composition of each food, calculate the cost of each lesson, note the length of time which it takes to prepare every recipe, find out at what meal each one of the foods prepared would be served, and learn to find the nutritive value of each recipe.

With the exception of the bread lesson, the following lessons may all be prepared in 60 minutes.

Creamed Potatoes or Cauliflower or Carrots

Cream of Potato or Tomato Soup

Simmered Beef

Beef Loaf and Coffee

Poached, Boiled, Scrambled Eggs

Cooked Salad Dressing — Cabbage Salad — Potato Salad

Biscuit — Shortcake

Muffins and Gingerbread, Johnnycake
Bread
Plain Cake
Sugar Cookies or Oatmeal Cookies
Apple Pie
Custard — Custard Puddings as rice, tapioca, or bread
Plan, prepare, and serve a simple luncheon.

SCHOOL LUNCHES

Another method of teaching cooking in the one-room rural school is by having the pupils prepare and serve one warm dish to supplement the cold lunch brought from home.

Object of the Work. — The object of this work is not to furnish a meal, but some warm food to supplement the cold lunch brought from home; to make the noon mealtime serve as a social hour; to furnish a pleasanter place for eating lunch than the school steps, the wood pile, the entry way, or the various other places where pupils have been accustomed to eat their lunches; to teach table manners, politeness, and common social customs; to teach boys and girls to share work; to teach some things about serving foods and planning meals; to interest pupils in cooking, in knowing the nutritive value of foods, the relation of foods to health; to interest pupils in gardening, raising of foods, — vegetable and animal; to bring school and home more closely together by interesting mothers in the work; to give school credit for work done at home under the guidance and direction of mother and teacher; to give to pupils in the rural schools some of the advantages and opportunities which all pupils in the city schools enjoy.

How to make a Success of the Work. — Keep in mind that the object of this work is not slum or settlement work.

That, except in rare instances, people in the country can all afford to furnish good, nutritious meals for their children. That the reasons why this work is attempted are social, ethical, and educational rather than philanthropic. That the work should not be an additional task for a teacher already overworked, but should be a pleasant diversion for the pupils after they have spent the morning in academic work. That the teacher should not be the only one interested and responsible, because no pupils remain interested unless they share work and responsibility. Insist on parents sharing the responsibility. Invite the mothers to school on a certain day and plan lunches with them. Have different mothers provide foods occasionally, — as a pot of baked beans, cold potatoes and meat for hash, or loan fat for a frying lesson of doughnuts or saratoga chips. Always remember that no community work is worth while unless the labor is shared by all, and all share the pleasure. Normal children like to work with their hands.

SCHOOL EQUIPMENT FOR SERVING LUNCH

An oil stove with oven, unless cooking can be done on the stove used for heating.

A kitchen table or a large box covered with an oil cloth.

2 dishpans
Soap
A frying pan
A drip pan for oven
A paring knife
A butcher knife
A large bowl
A large spoon and ladle
A board for cutting bread, meat, or for rolling out cookies, doughnuts, etc.
A large kettle
A garbage pail
A water pail

A fireless cooker would be desirable.

Dish towels and wiping towels, made out of flour sacks which may be brought from home or purchased at the bakers, in town, for a very small sum.

Dishes enough to serve the pupils — each pupil may bring his dishes from home, but do not use old, discolored, nicked dishes. They tend to make the dishwasher careless and to lower the taste of the pupils in regard to neatness and attractiveness of table service; they sometimes spoil the appetite.

A dry goods box may be fitted with shelves and a curtain, and placed against the wall. This will hold utensils when they are not in use.

How to Secure Supplies. — Supplies may be brought from home by the various pupils in turn. Supplies may be purchased by the teacher from funds furnished by the school board. Supplies may be purchased from funds derived from entertainments, school fairs, or prizes secured by pupils who enter things made at school at county or state fairs. The best method is probably to have the mothers supply the food needed, as things can be supplied from farm homes at much lower cost than they can be purchased by the teacher at city stores. This is the hardest problem for the teacher and should be solved by the community.

Suggestions for Serving the School Lunch. — Pupils bring their lunch from home and the school lunch supplements. Prepare but one dish each day and vary the dish from day to day.

Let pupils know what the dish is to be; plan a week ahead.

Have one or two of the girls make all preparations, before school opens (that can be made), so that the lunch work interferes but little with the pupils' regular school work.

Have one girl get the food ready to serve when school is dismissed, or pupils will start to eat their lunches from their lunch boxes.

Have each pupil set his desk with paper napkin for the table cloth, and place the knife, fork, spoon, and cup in proper position.

Have each pupil fill his own glass or cup with water before the hot food is served.

Have all pupils seated but the server, teacher included, if possible.

Have the older girls do the serving and preparing of food at first, then pupils in turn.

Have all pupils remain seated at their desks until they have been excused by the teacher.

Have some pupils prepared to encourage conversation, stories, and laughter at the meal. Make the meal time a social hour.

Have each pupil scrape his own plate and other dishes and pile them properly.

Have the boys scour the knives and utensils, carry the water, tend the fire, and empty the dishwater and refuse.

Have two different pupils wash the dishes daily until all have shared in the work.

FOODS WHICH MAY BE EASILY AND QUICKLY PREPARED

Baked apples
Baked potatoes
Creamed potatoes, creamed carrots, etc.
Scalloped potatoes
Rice and cheese
Rice and milk and sugar
Mush and milk
Tomato soup, pea soup, potato soup
Corn chowder
Cocoa, cereal coffee
Bacon and eggs
Bacon and corn

Apple sauce
Dried fruits, as prunes
Cottage pie
Macaroni and cheese
Brown Betty
Gingerbread
Cookies
Custard
Hash, meat and cold potatoes brought from home
Doughnuts
Fritters

BOOKS TO READ

"How the World is Fed," Carpenter.
"How We are Fed," Chamberlain.
Bulletins on Foods from the U. S. Dept. of Agriculture.

LIST OF FARMERS' BULLETINS

These may be obtained free.

34. Meats: Composition and Cooking.
121. Beans, Peas, and Other Legumes as Food.
131. Household Tests for Oleomargarine and Renovated Butter.
142. Nutrition and Nutritive Value of Food.
175. Home Manufacture and Use of Unfermented Grape Juice.
203. Canned Fruits, Preserves, and Jellies.
256. Preparation of Vegetables for the Table.
295. Potatoes and Other Root Crops as Food.
298. Food Value of Corn and Corn Products.
391. Economical Use of Meat in the Home.
413. The Care of Milk and Its Use in the Home.
270. Modern Conveniences for the Farm Home.
377. Harmfulness of Headache Mixtures.
521. Canning Tomatoes at Home and in Club Work.
Comforts and Conveniences in Farmers' Homes.

389. Bread Making.
363. Milk as Food.
348. Bacteria in Milk.
182. Poultry as Food.
293. Fruit as Food.
93. Sugar as Food.
85. Fish as Food.
375. Care of Food in the Home.
359. Canning Vegetables at Home.
332. Nuts; Their Uses as Food.
249. Cereal Breakfast Foods.
241. Butter Making on the Farm.
166. Cheese Making on the Farm.
128. Eggs; Their Uses as Food.

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